

Autism Spectrum Disorders: Guide to Evidence-based Interventions

A 2012 CONSENSUS PUBLICATION

Missouri Autism
Guidelines Initiative

Sponsored by the Thompson Foundation for Autism; the Division of Developmental Disabilities, Missouri Department of Mental Health; the Office of Special Education, Missouri Department of Elementary and Secondary Education; and Mercy Children's Hospital – St. Louis and Springfield



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Missouri Autism
Guidelines Initiative

Missouri Autism Guidelines Initiative

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Working together as the Missouri Autism Guidelines Initiative, we are proud to have initiated the collaborative process between parents and professionals which has resulted in our second publication, the companion document to our 2010 publication, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment*.

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Introduction

CHAPTER 1



Introduction

This *Guide*, produced by the Missouri Autism Guidelines Initiative, describes evidence-based interventions for individuals with autism spectrum disorders (ASDs) based on six recent nationally recognized systematic research reviews. The document provides information and tools to support individuals with ASDs and their families and to assist healthcare professionals, educators, and other community-based service providers in making informed decisions about selection, implementation, and monitoring of ASD interventions.

Throughout the *Guide* several key concepts emerge regarding evidence-based interventions.

- **Emphasis on evidence-based practice.** Evidence-based practice has become the current benchmark for professionals in medicine, psychology, education, and other healthcare fields. Evidence-based practice includes a combination of the best available scientific evidence, professional expertise, and understanding of client characteristics.
- **Scientific research informs evidence-based practice.** Review of evidence from scientific research is the foundation of evidence-based practice and decision making regarding interventions to consider and those to avoid. Current research evidence provides important information about effective ASD interventions, but more research is needed. (For example, research on interventions for adults with ASDs is extremely limited.) Lack of the highest quality research data about an intervention does not in itself preclude consideration of that intervention.
- **Evidence-based practice is informed by professional expertise.** Although scientific research is critical to evidence-based practice, professional expertise and judgment guide the interpretation and application of available research evidence.
- **Evidence-based practice includes consideration of individual characteristics.** Intervention decisions for individuals with ASDs are not based solely on scientific evidence and professional expertise, but are made in the context of the strengths, concerns, values, and preferences of the person with an ASD and his or her support network. This network includes the family, the professional team, and available community resources.
- **Importance of systematic research reviews.** The rapid growth of the scientific literature on ASDs makes it challenging for families and practitioners to stay up-to-date with research findings. Systematic reviews play an important role in summarizing and synthesizing the knowledge base on ASD interventions. To provide individuals with ASDs, their families, and professionals with the most current evidence to guide intervention planning and implementation, this project presents findings from six nationally recognized systematic research reviews on evidence-based ASD interventions.

- **Effective ASD interventions can lead to improved outcomes.** The systematic reviews presented in this *Guide* describe effective evidence-based interventions that have produced positive outcomes for individuals with ASDs. Outcomes are maximized when interventions are matched to individual characteristics and begun as early as possible.

The Need for This Guide

Autism spectrum disorders (ASDs) now affect approximately 1 in 88 American children (CDC, 2012). ASDs have lifelong effects on individual functioning in areas such as learning, relationships, and independence in daily life. The initial publication of the Missouri Autism Guidelines Initiative, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment* (www.autismguidelines.dmh.mo.gov), presents current best practice in screening, diagnostic evaluation, and assessment for intervention planning for individuals with ASDs. This *Guide* is a companion publication that begins where the initial document left off—with the importance of comprehensive assessment for intervention planning—and describes the next steps in the intervention process including development and implementation of an intervention plan.

PATHWAY TO IMPROVED OUTCOMES

FIGURE 1.1

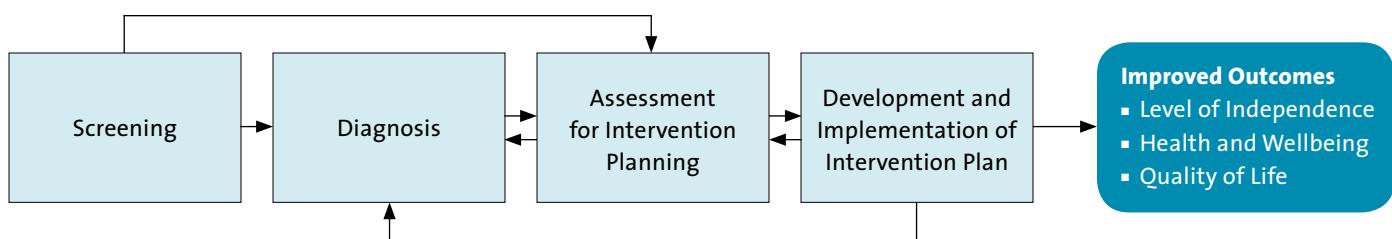


Figure 1.1 attempts to capture the dynamic nature of the process from screening to improved outcomes. Although the steps are depicted as occurring one after the other, the sequence of the steps varies based on individual needs and what providers are able to accomplish with available skills and resources. Development and implementation of an intervention plan is depicted as occurring after diagnosis, but it may begin earlier in the process. For example, when screening results are positive, children may be immediately referred for certain intervention services; in these cases, assessment, selection, and implementation of initial interventions may occur while plans are being made to conduct the diagnostic evaluation. Information from initial assessment and intervention can then inform the diagnostic process and future intervention decisions.

Assisting persons with ASDs and their families to achieve positive outcomes is a continuous and ongoing process. Interventions for ASDs vary in scope, focus, purpose, intensity, duration, and methodology. They focus on improving social interaction and communication, addressing challenging behaviors, increasing educational engagement and achievement, treating commonly associated difficulties (e.g., anxiety), promoting independence, and improving quality of life. Intervention goals vary for different individuals and most individuals with ASDs receive a combination of interventions. Access to effective intervention is critical. Individuals with ASDs, their families, and professionals who care for persons with ASDs all want to use interventions that work. Over the past 5 years, several nationally recognized research groups have used systematic reviews to describe the available evidence on the effectiveness, benefits, and harms of different intervention options for individuals with ASDs. The methods used in these reviews differ and, as a result, the reviews differ to some extent in their findings. Yet an important message consistently emerges across all of the reviews: **Although this is an evolving field, research evidence on the effectiveness of interventions for ASDs has shown promise. There are effective interventions that produce positive outcomes for persons with ASDs.**

To make the best decisions about intervention options for persons with ASDs, individuals with ASDs and their families, healthcare professionals, educators, and other service providers need up-to-date information about intervention choices. The six systematic research reviews summarized as a key part of this publication fill a need for this type of information (see Chapter Four). In addition, a list of 39 effective interventions has been developed by consensus of the Missouri Autism Guidelines Initiative to describe interventions ranked at the top level of research support by one or more of the systematic reviews summarized in this *Guide*. This list of interventions provides a synthesis of findings across reviews (see Chapter Three). It is not the intention of this document to recommend what interventions should or should not be used for a specific individual with an ASD. Instead, the document describes an evidence-based approach to intervention selection as part of an overall process that includes comprehensive assessment for intervention planning, development and implementation of an intervention plan, and progress monitoring.

Overview of Evidence-based Practice

Evidence-based practice originated in the medical field, where thousands of carefully controlled research studies have been conducted. Dr. David Sackett, a pioneer in evidence-based practice, and his colleagues defined evidence-based medicine as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research” (Sackett et al., 1996, 71-72). Similarly, the Institute of Medicine has defined evidence-based practice as “the integration of best-researched evidence and clinical expertise with patient values” (National Research Council, 2001).

Disciplines such as psychology and education have embraced the evidence-based practice movement as a nationwide effort to build quality and accountability. The American Psychological Association has defined evidence-based practice as “the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences” (APA, 2001).

Definitions incorporated into state and federal laws and regulations also guide practice. For example, the regulations for the federal law which ensures that all children with disabilities have access to a free and appropriate public education (FAPE), the Individuals with Disabilities Education Act (IDEA), requires that educational strategies be based on “scientifically based research.” The regulations define scientifically based research “as research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs” [20 U.S.C. 1411 (e) (2) (C) (xi)]. Similarly, the National Center on Response to Intervention, a national technical assistance center for schools and school districts, defines evidence-based interventions as those “for which data from scientific, rigorous research designs have demonstrated the efficacy of the intervention” (National Center on Response to Intervention, 2010, p. 6).

Although there is no universal definition of evidence-based practice, definitions from diverse areas of professional practice share the following core theme: Evidence-based practice requires careful assessment of current research with the goal of identifying interventions that have demonstrated effectiveness.

- The quality of research studies must be assessed, as this varies from study to study.
- More than one study by more than one research group must show the same outcome to ensure confidence in the results.
- Evidence must be considered in the context of professional expertise and individual characteristics.

EVIDENCE-BASED PRACTICE AS A FRAMEWORK FOR ASD INTERVENTION

Individuals with ASDs, their families, and providers all want to select interventions that result in improved outcomes. This Guide presents evidence-based practice as a framework for decision making that results in selection and implementation of interventions that are most likely to be effective in meeting the goals of a specific individual with an ASD. Evidence-based practice includes consideration of the **best available research evidence** in the context of **individual characteristics** and **professional expertise** (see Figure 1.2).

EVIDENCE-BASED PRACTICE

FIGURE 1.2



Chapter Two describes an evidence-based approach to intervention selection as part of a three-step intervention process that includes assessment for intervention planning, development and implementation of an intervention plan, and progress monitoring. Following assessment to identify the individual's strengths and needs, families and providers work together to review interventions with a high level of research support that fit with individual intervention goals and other individual characteristics. Intervention selection includes consideration of individual and family values and preferences, as well as available family and community resources. Professional expertise plays a critical role in interpreting and applying research findings during intervention selection and informs decision making throughout the intervention process.

SYSTEMATIC REVIEWS PROVIDE THE BEST AVAILABLE RESEARCH TO SUPPORT EVIDENCE-BASED PRACTICE

Evidence-based practice is not uniformly applied in all areas of professional practice or by all professionals in any given discipline. Some professionals contact trusted colleagues who are familiar with the research literature for suggestions regarding effective interventions. Others use interventions with which they have extensive experience in improving outcomes. Two other approaches to evidence-based practice have been described (Dijkers, 2008). In the first approach, a professional who is faced with a decision regarding which intervention to use searches the literature, reviews abstracts to identify relevant studies, retrieves copies of these studies, synthesizes their findings, and integrates this information with his or her professional experience and the characteristics of the person with an ASD to select the intervention. In the second approach, professionals turn to systematic reviews to guide their decision making.

This *Guide* presents systematic reviews as the best available research evidence to support evidence-based practice. Systematic reviews are developed by groups of researchers who collaborate to systematically search for, evaluate, and synthesize *all* relevant studies on a specific topic. Combining studies mathematically provides more precise information about the results of an intervention (e.g., effect size) and addresses any differences in research results. All systematic reviews use a hierarchy of research designs to sort the stronger evidence from the weaker. In their recommendations, the authors of systematic reviews take into account the quality, quantity, and consistency of the evidence.

Although the systematic reviews provide summaries of the best available research evidence, members of the Missouri Autism Guidelines Initiative recognize the limitations of these reviews. For example, many systematic reviews have used such strict standards for evaluating research evidence that very few studies qualify for consideration; as a result, very few interventions are considered effective and the need for more research becomes the main finding of the review. Such highly technical decisions about research methodology can result in significant real world consequences related to individual access to intervention services. Therefore, this *Guide* acknowledges the limitations of currently available research including findings from systematic reviews and emphasizes that research evidence is only one component of evidence-based practice. As described above, the best available research evidence is considered in the context of informed professional judgment and individual characteristics. Intervention decisions include consideration of each individual's unique presentation including specific strengths and needs, individual and family values and preferences, and available family and community resources.

Research Reviews that Inform This Guide

Six nationally recognized systematic reviews of ASD interventions have been selected by the Missouri Autism Guidelines Initiative as the focus of this *Guide*. These reviews were sponsored by federal government agencies, nationally recognized nonprofit organizations with expertise in developmental disabilities, or nationally recognized academic institutions. Together, they provide up-to-date information on the effectiveness of a broad array of ASD interventions that include behavioral, educational, medical, allied health, and complementary and alternative interventions.

The research reviews are listed in Table 1.1. The table includes abbreviations for the review's sponsoring organization (**in bold**) as well as the full citation for the published review to assist in its retrieval. An overview of the reviews is presented in Chapter Three on pages 60 and 61. It provides a side-by-side comparison of the reviews in terms of focus, age range, number of studies reviewed, dates of research reviewed, and classification systems to rank effectiveness.

SYSTEMATIC REVIEWS PRESENTED IN THIS GUIDE

TABLE 1.1

SPONSORING ORGANIZATION	ABBREVIATION USED IN GUIDE	FULL CITATION(S)
National Professional Development Center on Autism Spectrum Disorders	NPDC	<p>U.S. Department of Education Office of Special Education Programs, National Professional Development Center on Autism Spectrum Disorders. (2010). <i>Evidence-based practices for children and youth with ASD</i>. Retrieved from http://autismpdc.fpg.unc.edu/content/evidence-based-practices</p> <p>Odom, S. L., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders. <i>Preventing School Failure</i>, 54(4), 275-282. Available from http://www.tandf.co.uk/journals</p>
Centers for Medicare and Medicaid Services (Prepared by IMPAQ)	CMS	<p>Young, J., Corea, C., Kimani, J., & Mandell, D. (2010). <i>Autism spectrum disorders (ASDs) services: Final report on environmental scan</i> (pp. 1-59). Columbia, MD: IMPAQ International. Retrieved from http://www.impaqint.com/files/4-content/1-6-publications/1-6-2-project-reports/finalasdreport.pdf</p>
National Autism Center	NSP	<p>National Autism Center. (2009). <i>National standards report: The national standards project—Addressing the need for evidence-based practice guidelines for autism spectrum disorders</i>. Retrieved from http://www.nationalautismcenter.org/pdf/NAC%20Standards%20Report.pdf</p>
Agency for Health-care Research and Quality (Prepared by Vanderbilt Evidence-based Practice Center)	AHRQ	<p>Warren, Z., Veenstra-VanderWeele, J., Stone, W., Bruzek, J. L., Nahmias, A. S., Foss-Feig, J. H.,...McPheeters, M. (2011). <i>Therapies for children with autism spectrum disorders</i>. Comparative Effectiveness Review Number 26. AHRQ Publication No. 11-EHC029-EF. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from http://www.effectivehealthcare.ahrq.gov/ehc/products/106/656/CER26_Autism_Report_04-14-2011.pdf</p>

(CONTINUED)

SYSTEMATIC REVIEWS PRESENTED IN THIS GUIDE			TABLE 1.1
SPONSORING ORGANIZATION	ABBREVIATION USED IN GUIDE	FULL CITATION(S)	
Stanford Autism Research Team	StART	Huffman, L. C., Sutcliffe, T. L., Tanner, I. S. D., & Feldman, H. M. (2011). Management of symptoms in children with autism spectrum disorders: A comprehensive review of pharmacologic and complementary-alternative medicine treatments. <i>Journal of Developmental and Behavioral Pediatrics</i> , 32, 56-68. Available from www.jdbp.org	
Evaluation of Comprehensive Treatment Models for Individuals with Autism Spectrum Disorders	CTM	Odom, S. L., Boyd, B. A., Hall, L. J., & Hume, K. (2010). Evaluation of comprehensive treatment models for individuals with autism spectrum disorders. <i>Journal of Autism and Developmental Disorders</i> , 40, 425-436. Retrieved from http://dcautismparents.org/yahoo_site_admin/assets/docs/ABA_14.9261728.pdf	

This Guide presents data from the six systematic reviews in multiple formats. The citations for the research reviews are listed above and integrated in several places throughout the document for individuals who wish to refer to or read the original publications. Summaries of each of the six reviews are provided in Chapter Four for readers interested in a more concise description of the objectives, methods, and results of each review. Chapter Three synthesizes the research findings across the six reviews and highlights 39 effective interventions identified by consensus of the Initiative based on the interventions ranking at the top level of research support by one or more of the systematic reviews.

Core Values of the Missouri Autism Guidelines Initiative

In addition to emphasizing evidence-based practice, the current Guide continues to reflect several core values initially introduced in the Initiative's companion publication, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment*.

FAMILY-CENTERED CARE

For most clinical and community-based services, the needs, priorities, and resources of the individual with an ASD and his/her family are understood to be the primary focus and are respectfully considered throughout the intervention process. A family-centered frame of reference includes cultural sensitivity and regard for diversity of cultural values, language, religion, education, socio-economic, and social-emotional factors. Providers listen to the concerns, values, and goals of the individual and his/her family. Families are treated as equal partners and are encouraged to play an active role in selecting and implementing interventions and monitoring their effectiveness. Providers collaborate with individuals with ASDs and their families throughout the intervention process. Evidence-based practice includes an emphasis on family-centered care; intervention selection involves consideration of individual characteristics including family values and preferences, as well as family resources.

In contrast to the focus of clinical and community-based services, the primary focus of the public education system is defined by federal legislation as providing students (ages 3 years and above) with access to a free and appropriate public education (FAPE). Decisions regarding eligibility for services, individual goals, and intervention selection are made by an educational team of which the student with an ASD (as appropriate) and his/her family are important members.

EARLY INTERVENTION AND ONGOING SUPPORTS

The weight of the evidence indicates that early identification and early intervention can maximize the progress of children with ASDs. In addition, individuals with ASDs benefit from ongoing access to intervention services to address needs that arise over the course of their development. When a diagnosis is made or additional needs are identified at a later age, older children, adolescents, and adults can continue to benefit from appropriate intervention services. Therefore, intervention planning includes consideration of the need to start as early as possible and sustain needed interventions over the life span, with enhanced monitoring during times of developmental transition (e.g., from early childhood programs to public school, or from adolescence to adulthood).

INFORMED PROFESSIONAL JUDGMENT

In the initial Initiative publication, informed professional judgment was presented as critical to best practice in screening, diagnosing, and assessing individuals with ASDs. The current *Guide* continues to emphasize informed professional judgment as a core ingredient of high quality ASD services and presents professional expertise as a component of evidence-based practice. During the intervention process, informed professional judgment plays a critical role in interpreting and applying research findings, tailoring interventions to match individual characteristics and needs, incorporating family values and preferences, considering available resources, implementing the plan, establishing appropriate goals and procedures for monitoring progress, and interpreting progress monitoring data.

THE INTERDISCIPLINARY TEAM

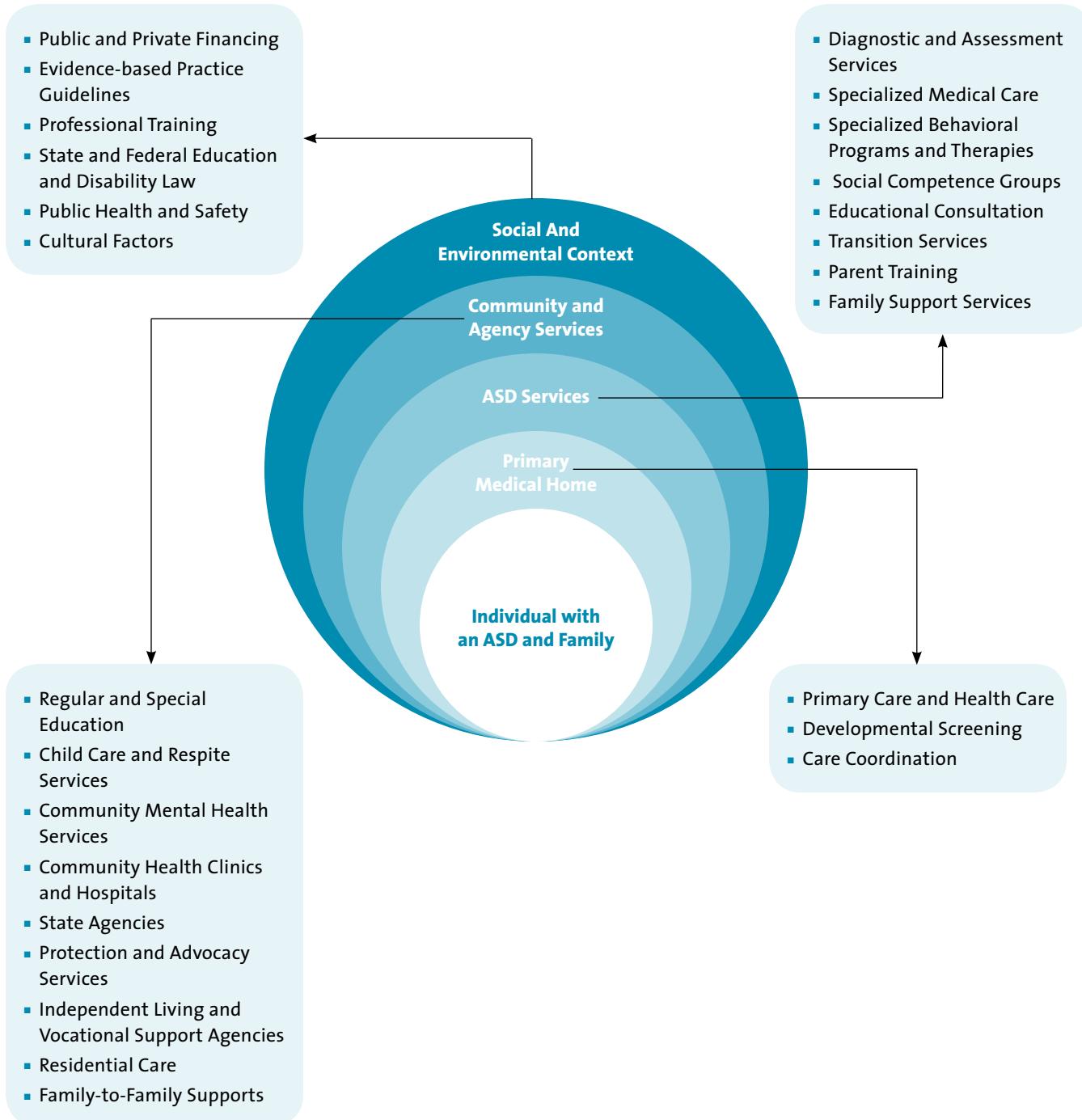
Because of multiple developmental domains impacted by ASDs, the intervention process requires involvement of professionals representing multiple disciplines (e.g., primary and specialty physicians, nurses, psychologists, speech-language professionals, audiologists, occupational therapists, social workers, behavioral and educational specialists, applied behavior analysts, teachers, etc.). As shown in Figure 1.3, several service systems typically are involved in providing interventions including clinical, educational, and other community-based services. Individuals with ASDs and their families are core members of the intervention team. Families work collaboratively within and across disciplines and systems of care to integrate the various services. One professional team member often takes responsibility to work closely with families to support their efforts to access comprehensive and coordinated care.

COMMUNITY COLLABORATION

The concept of community collaboration is integrated throughout this document as a way to promote discussion among clinicians, educators, state programs, researchers, and families as they move toward improved service delivery for persons with ASDs. Consistent with national recommendations for ASD service delivery (Interagency Autism Coordinating Committee, 2005), the *Guide* promotes access to a range of high quality interventions through interdisciplinary and interagency collaboration with the referred individual and the family. As presented in the Initiative's companion publication, Missouri has adopted a framework for community collaboration that depicts an interwoven network promoting the best outcomes for persons with ASDs (see Figure 1.3). In addition to addressing ASD or disability-specific care, this framework acknowledges the individual's need to access other community and agency services while also taking into account the current social and environmental context such as state and federal laws, the availability of public and private health insurance, and cultural factors.

COMMUNITY COLLABORATION MODEL

FIGURE 1.3



How to Use This Guide

This *Guide* is intended as a companion publication to the initial work of the Missouri Autism Guidelines Initiative entitled *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment*. Together the two documents provide an up-to-date summary of the continuous and ongoing processes through which families and providers collaborate to improve outcomes for individuals with ASDs.

This *Guide* has been developed for several audiences — persons with ASDs and their families, healthcare professionals, educators, and other service providers. The *Guide* presents information in multiple formats and utilizes multiple devices to allow readers to access the information presented at a level of breadth, depth, and complexity that best meets their needs. Findings from the systematic reviews are presented in multiple formats ranging from a synthesis of findings in Chapter Three to more detailed summaries in Chapter Four to references for accessing the original publications. For that reason, there is some repetition of key concepts from chapter to chapter.

However, consideration of the best available data is only one aspect of evidence-based practice, and intervention selection is only one component of the intervention process. To provide a more comprehensive understanding, Chapter Two describes the three steps in the intervention process and presents evidence-based practice as a framework for intervention selection during intervention plan development. Because the intervention process can vary across the multiple service delivery systems typically involved in ASD intervention, Chapter Two also presents more detail about the intervention process from the perspectives of families, medical and other healthcare professionals, educators, and other service providers. Case examples are presented to illustrate key ideas. The document also includes a comprehensive glossary, bibliography, and several appendices that reference documents and websites that may be useful in implementation of the ideas contained in the *Guide*.

Evidence-based Intervention

CHAPTER 2

CHAPTER 2



Introduction

Receiving an autism spectrum disorder (ASD) diagnosis often is daunting for individuals and their families because ASDs are associated with life-long difficulties that may interfere with independent functioning, health and well-being, and quality of life. However, evidence-based research indicates that effective interventions can lead to improved outcomes. This Guide describes ASD intervention as part of a process that begins with screening, diagnosis, and assessment for intervention planning; the ultimate result of the process is selection and implementation of interventions that help individuals with ASDs reach their goals. The term intervention is an inclusive description of procedures used to improve outcomes for individuals with ASDs variably described by other authors as treatments, programs, strategies, supports, or services.

Current research demonstrates that ASDs are due to alterations in brain functioning—in other words they are brain-based disorders (e.g., Wass, 2011). Despite this understanding, technology is not yet sufficiently advanced nor are the biological variations specific enough to allow diagnosis of ASDs based on brain imaging or to support direct biological therapies. Nonetheless a great deal of recent research indicates that early brain development is a dynamic process in which brain growth and development are intimately related to environmental stimulation. The interaction of the individual with other people and their environment drives the biological formation of complex interconnected brain systems and molds the efficiency of brain processes and connectivity (Garber, 2007). Although most ASD interventions are not directly biological in nature, they have been shown to alter brain development (Dawson, 2008). Appropriate interventions can lead to positive effects by making changes in the individual's environment, adjusting how others interact with the individual, improving functioning, and teaching new skills. Involvement of parents and caregivers is essential to effective ASD intervention because of their prominent role in shaping the environment and experiences of the child or individual in their care. Emphasis on early intervention for ASDs is based on strong evidence that the biological processes that provide the interconnected systems for all brain functions are their most "plastic" and responsive to environmental influences during the first years of life (Altemeier & Altemeier, 2009; Dawson, 2008; Greenough, Black, & Wallace, 1987). However, evidence-based research indicates that effective ASD interventions provided for older children, adolescents, and throughout the lifespan also can produce improved outcomes.

There is no one-size-fits-all approach to intervention for persons with ASDs. Individuals with ASDs vary significantly in their strengths and needs related to core ASD symptoms and other areas of development that may be impacted by ASDs. Other developmental or mental health disorders that require clinical attention also may impact individual functioning and require clinical attention. This complicates the clinical picture and requires careful evaluation to identify additional challenges that should be a focus of intervention.

ASD interventions do not address the diagnosis in general, but rather address specific individual needs. Most individuals with ASDs receive multiple interventions from multiple types of providers in multiple service delivery systems. For example, it is not uncommon for persons with ASDs to simultaneously participate in interventions with healthcare, educational, and other service providers. Intervention outcomes are significantly enhanced when professionals collaborate across service delivery systems and when parents play an active role in implementing and coordinating interventions.

This chapter describes in detail the process used by individuals with ASDs, their families, and providers working together to select, implement, and monitor interventions that provide the best-fit for the individual and are most likely to produce the desired results. It is organized as follows:

- Introduction
 - Importance of Community Collaboration
 - Evidence-based Practice Provides a Framework for Effective ASD Intervention
- The Intervention Process
 - Step One. Conduct Assessment
 - Step Two. Develop Intervention Plan
 - Step Three. Monitor Progress
 - Families and the Intervention Process
- The Intervention Process Across Service Delivery Systems
 - Special Considerations for Service Delivery Systems
 - Special Considerations for Healthcare
 - Special Considerations for Other Service Systems
 - Special Considerations in Public Education
 - Transitions Between Delivery Systems

IMPORTANCE OF COMMUNITY COLLABORATION

Community collaboration is a core value of the Missouri Autism Guidelines Initiative and remains an essential part of effective practice during the intervention process. Inter-agency and interdisciplinary collaboration with individuals with ASDs and their families promotes access to a range of high-quality interventions. Most persons with ASDs receive a combination of interventions provided by different service delivery systems. One study estimates that during a 6-month period, children with autism receive an average of six different types of intervention services provided by an average of four different agencies and seven different professionals (Kohler, 1999). Intervention plan development and implementation are enhanced when information is shared across settings and efforts are made to coordinate interventions so that they work in a complementary or, at least, parallel manner. Gaps in communication and lack of collaboration among providers and service systems consistently are identified as a source of significant confusion and challenges for individuals with ASDs and their families. Therefore, it is essential for professionals involved in the intervention process to understand the basic similarities and differences between the various service systems and collaborate with families and other providers involved in intervention across settings. Families also play a critical role in facilitating community collaboration. Table 2.1 provides some examples of ways that professionals and persons with ASDs and their families can facilitate communication and coordination of services. Additional information about community collaboration is provided in Chapter One and in the companion publication, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment*.

COMMUNITY COLLABORATION IN ACTION

TABLE 2.1

PROFESSIONALS CAN FACILITATE COMMUNITY COLLABORATION BY ...	PARENTS CAN FACILITATE COMMUNITY COLLABORATION BY ...
<ul style="list-style-type: none"> ▪ Encouraging parents to sign release forms to allow data sharing across disciplines and service delivery systems. ▪ Educating themselves and colleagues about the systems of care (healthcare, educational, and other support services) and various treatment models involved in ASD intervention. ▪ Initiating team meetings across service delivery systems. ▪ Establishing similar or complementary goals across disciplines and intervention providers as often as possible. ▪ Beginning to think about transition services as early as possible. ▪ Providing training for parents and other professionals. ▪ Utilizing information technology solutions to make communication across systems more efficient. 	<ul style="list-style-type: none"> ▪ Signing release forms to allow information sharing, as appropriate. ▪ Educating themselves about the systems of care (healthcare, educational, and other support services) and various treatment models involved in ASD intervention. ▪ Networking with other families about intervention information, strategies for collaborating with providers, and planning for transitions. ▪ Joining a parent support group to facilitate contact with other parents of children with ASDs. ▪ Attending parent trainings. ▪ Organizing information to be shared with providers such as names and contact information of intervention providers, current medications, intervention plans, etc. Consider consolidating key information into a fact sheet, which is updated regularly and can be shared with all service providers on a regular basis.

EVIDENCE-BASED PRACTICE PROVIDES A FRAMEWORK FOR EFFECTIVE ASD INTERVENTION

Individuals with ASDs, their families, and providers want to select interventions that provide the best fit for the individual and are most likely to produce the desired results. This Guide presents evidence-based practice as a framework for intervention decision making that results in selection and implementation of interventions that are most likely to be effective for a specific individual with an ASD.

Evidence-based practice includes consideration of the best available research evidence in the context of individual characteristics and professional expertise.

EVIDENCE-BASED PRACTICE

FIGURE 2.1



Best Available Research

Evidence-based research provides a starting point for determining what interventions are most likely to be effective in achieving the desired outcomes for an individual. Chapters Three and Four of this Guide provide up-to-date information on the level of currently available evidence supporting both focused and comprehensive interventions for children and adults with ASDs. Consideration of the following questions can aid in evaluating the research available about a specific intervention:

- Who conducted the research?
- When was the research conducted?
- What scientific procedures were used to ensure the quality of the research?
- Is the research presented as a systematic review? If not, has the research been peer-reviewed by qualified researchers?
- Is there sufficient evidence that the intervention is effective?
 - For what types of goals or skills is it effective?
 - Is there evidence the intervention will be effective for a specific age group or diagnostic group?
- Across several of the research reviews, is the evidence of effectiveness similar? If not, how and why do the findings differ?

Individual Characteristics

An understanding of individual characteristics provides a filter for reviewing research evidence in search of interventions that provide a good fit for the individual's strengths and needs, individual and family values and preferences, and available resources.

Individual Strengths and Needs. Although all individuals diagnosed with ASDs have some social, communication, and behavioral difficulties, there is significant variability in the number, severity, and type of impairments presented. Individuals also exhibit unique strengths and needs in other areas that can be impacted by ASDs. Because ASD interventions target specific needs or skills, rather than treating ASDs in general, whether an intervention is likely to be effective depends on the specific strengths and needs of

the individual. Research data are reviewed to identify ASD interventions that have been demonstrated to be effective in addressing a target need or skill in individuals with similar characteristics. Individual characteristics that often are central to intervention selection include the individual's age, level of cognitive functioning, level of functional communication, nature and extent of social impairment, any intrusive stereotypic preoccupations, and any co-occurring psychiatric symptoms.

Understanding individual variation in responses to environmental features also plays an important role in intervention planning. Many individuals with ASDs are highly sensitive to variation in their environments and may have pronounced reactions to seemingly trivial characteristics of the environment that can profoundly interfere with daily functioning (Kanne, Abbachi, & Constantino, 2009). Identifying environmental features that are aversive or are highly motivating for a specific individual can be used to make environmental modifications and select interventions that improve individual functioning in home, school, and community settings.

Individual and Family Values and Preferences. Individuals with ASDs and their families are treated as partners throughout the intervention process. Parent and caregiver involvement are essential to maximizing the effectiveness of interventions because of their central role both in determining the child or individual's environment and experiences and in facilitating coordination of intervention services. Consideration of individual characteristics includes cultural sensitivity and regard for diversity of cultural values, language, religion, education, socio-economic, and social-emotional factors that influence the family's intervention preferences and participation.

Although the intervention process in public education pertaining to students with disabilities focuses specifically on providing students with access to a free and appropriate public education and follows decision-making procedures established by federal legislation and state regulations, family members and the individual with an ASD (as developmentally appropriate) are important members of the educational team.

Available Resources. Determination of goals and selection of specific interventions includes consideration of available family and community resources. For example, research evidence may support the effectiveness of a specific comprehensive program, but the program may not be available in all communities. Attempts to implement the program without the required training and resources may compromise the effectiveness of the intervention. Although advocacy can help to improve access to such programming over time, the extent of the resources and training required may mean that such change is not possible in a reasonable amount of time to benefit a specific individual. Fortunately, a broad range of intervention resources are available in Missouri that can help to increase the capacity of families, providers, agencies, and schools to provide interventions that are evidence based.

Professional Expertise

Emphasis on evidence-based research helps to provide assurance that individuals with ASDs receive the intervention services that are most likely to produce positive outcomes and are protected from ineffective or harmful interventions. However, the diversity among individuals with ASDs and limitations of currently available research can make it challenging to determine what interventions will provide the best fit for a specific individual. Providers use their training and experience to assist families in evaluating research data and selecting intervention approaches that are most likely to be effective. For example, if a family asks about a specific intervention that has not been shown to be effective, the provider may talk with the family about the goals they hope to address with that intervention and recommend alternative interventions that have a higher level of research support. The training and experience of the provider guide the content of this conversation.

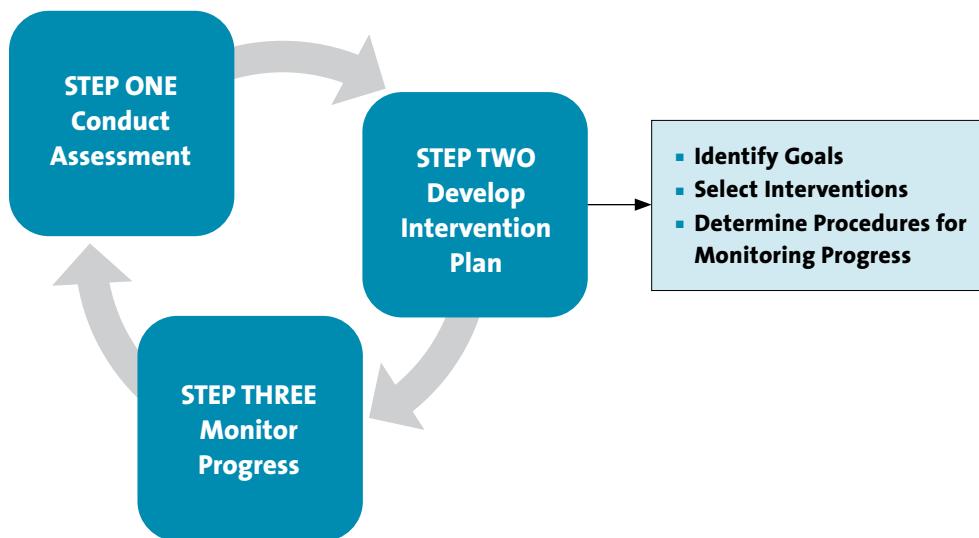
The Intervention Process

Evidence-based interventions can reduce ASD symptoms and increase independence, health and well-being, and quality of life for individuals with ASDs. This section of the chapter provides an overview of the intervention process that is similar across service delivery systems. Detailed information about the intervention process as it occurs in different service systems is provided later in the chapter.

ASD intervention is a continuous and ongoing process that begins with assessment for intervention planning (Step One). Assessment results are used to develop an individualized intervention plan (Step Two) which requires identifying goals, selecting interventions, and determining procedures for monitoring the individual's progress. As the intervention plan is implemented, progress monitoring data are used to adjust intervention strategies and update individual goals (Step Three). Over time, additional assessment and revisions to the intervention plan are completed, as needed.

THE INTERVENTION PROCESS

FIGURE 2.2



STEP ONE. CONDUCT ASSESSMENT

Assessment is the first step in the intervention process. Assessment for intervention planning identifies the unique intervention needs of each individual with an ASD. Because assessment involves professionals representing multiple disciplines, in *healthcare* settings a member of the multi-disciplinary team or an individual provider often is identified to collaborate with the family to integrate the findings into a descriptive profile of the individual with an ASD. In *public education* settings, findings are integrated by a member of the educational team such as a special education teacher or process coordinator.

Essential Components of Assessment

Assessment for intervention planning gathers information in *all* areas of individual functioning that may be impacted by an ASD or by an associated or co-morbid condition. All individuals diagnosed with ASDs are assessed in the following domains: cognitive and academic functioning; adaptive functioning; social, emotional, and behavioral functioning; communication; comprehensive medical examination; sensory and motor functioning; and family functioning. This list is intended to provide guidance for the key areas to be assessed

to inform intervention planning; it is not an exhaustive list. In addition, professionals involved in assessment for intervention planning are encouraged to consider available data from all prior assessments including assessments conducted in healthcare, educational, or other service settings. (Some assessment data may be derived during the diagnostic evaluation and will not need to be repeated during this step of the process.) Although each essential component is explored for all individuals diagnosed with ASDs, assessment for intervention planning is tailored to the unique needs of each individual and his or her family.

ESSENTIAL COMPONENTS OF ASSESSMENT FOR INTERVENTION PLANNING TABLE 2.2

COMPONENTS	WHAT IS ASSESSED?	HOW ARE RESULTS USED FOR INTERVENTION PLANNING?
Cognitive and Academic Functioning	<ul style="list-style-type: none"> ▪ Current developmental or cognitive level ▪ As indicated, academic and pre-academic skills ▪ As indicated, neuropsychological functioning 	
Adaptive Functioning	<ul style="list-style-type: none"> ▪ Level of day-to-day functioning in domains relevant to the individual's developmental level 	<ul style="list-style-type: none"> ▪ Identifies changes over time ▪ Identifies specific areas in need of intervention
Social, Emotional, and Behavioral Functioning	<ul style="list-style-type: none"> ▪ Overall level of social emotional functioning including impact of ASD symptoms such as stereotypic preoccupations or perseverations ▪ Level of social vulnerability and any experiences of victimization ▪ Symptoms of other mental health conditions ▪ Presence of any self-harm or suicidal ideation ▪ Challenging behaviors including environmental features that trigger problem behaviors or facilitate desired skills and behaviors 	<ul style="list-style-type: none"> ▪ Identifies strengths that can be used to support intervention in areas of concern ▪ Identifies individual characteristics, behaviors, or skills that may be related to strengths or needs in other areas ▪ Identifies individual characteristics that may help in selecting interventions that best fit the individual
Communication	<ul style="list-style-type: none"> ▪ Relevant domains of speech and language functioning including functional communication and pragmatic language 	
Sensory and Motor Functioning	<ul style="list-style-type: none"> ▪ As indicated, assessment of fine and gross motor skills, feeding and oral motor skills, and sensory functioning ▪ Assessment of sensory functioning should give specific attention to both negative reactions and strong preferences for specific sensory stimuli 	

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ESSENTIAL COMPONENTS OF ASSESSMENT FOR INTERVENTION PLANNING		TABLE 2.2
COMPONENTS	WHAT IS ASSESSED?	HOW ARE RESULTS USED FOR INTERVENTION PLANNING?
Comprehensive Medical Examination	<ul style="list-style-type: none"> ▪ Comprehensive health history including review of systems ▪ Definitive hearing and vision examination ▪ General physical ▪ Neurodevelopmental exam ▪ Any indicated laboratory tests or neuroimaging ▪ Consultation regarding medication management 	<ul style="list-style-type: none"> ▪ Confirms vision and hearing evaluations ▪ Considers the possible cause of the ASD (etiology) ▪ Identifies any medical conditions in need of further evaluation or treatment ▪ Identifies whether consultation for medication management is needed
Family Functioning	<ul style="list-style-type: none"> ▪ Level of parenting stress ▪ Impact on siblings and family functioning ▪ Extent of family's support network ▪ Resources accessed and of interest ▪ Financial impact of ASD diagnosis ▪ Legal considerations 	<ul style="list-style-type: none"> ▪ Provides a context for intervention planning ▪ Facilitates family-centered intervention ▪ Strengthens the family's ability to influence the well-being of the family member with an ASD

Assessment of these domains is guided by consideration of:

- **Clinical indicators.** Some components of assessment are indicated in all cases (e.g., cognitive, adaptive, and medical examination), whereas other types of follow-up may be warranted based on specific aspects of the individual's presentation. Professionals share their expertise with families and collaborate to determine what additional assessment is needed. For example, although not necessary for all individuals with ASDs, oral-motor evaluation may be indicated when individuals exhibit a pattern of oral-motor concerns such as drooling, choking, or consistency-based food aversions.
- **The individual's intervention history.** Information about the individual's prior or current participation in intervention services is considered in determining if additional assessment is needed. For example, if a child already receives speech-language therapy, then additional assessment in this area may not be needed or only very specific assessment needs may be identified.
- **Data from prior assessments.** At the outset of the assessment for intervention planning process, information from prior assessments is reviewed to determine current assessment needs. Providers consider data from assessments provided in healthcare, educational, and community settings.
- **Individual and family concerns and priorities.** Professionals listen to family concerns and collect relevant family information. Assessment specifically addresses the skills or behaviors that are most important to the individual and the family.

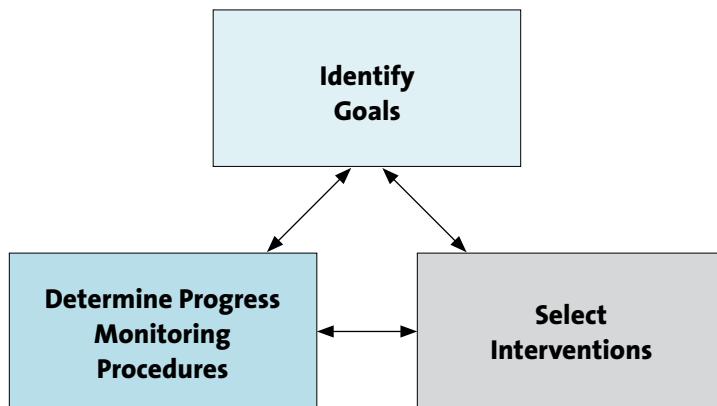
For more in-depth information on the concept of assessment for intervention planning as developed in this Guide, please refer to pages 79–98 of the companion document, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment* (www.autismguidelines.dmh.mo.gov).

STEP TWO. DEVELOP INTERVENTION PLAN

Families and individuals with ASDs (as developmentally appropriate) collaborate with professionals to develop an individualized intervention plan based on assessment data. Although the specific format and components of the intervention plan vary across providers and settings, intervention planning requires identification of intervention goals, selection of interventions, and determination of procedures to be used for progress monitoring.

INTERVENTION PLAN COMPONENTS

FIGURE 2.3



Component One. Identify Goals

Discussion of broad intervention goals typically begins well before assessment for intervention planning or development of an intervention plan. At the outset of screening or diagnostic evaluation, individuals, parents, and providers often express hopes for new skills, behavior changes, and long-term improvements. Assessment data are used to continue the discussion of intervention goals. Individuals, families, and providers collaborate to identify specific areas in which intervention is needed. Intervention goals reflect individual strengths and needs, as well as family values and preferences.

Goal selection includes consideration of characteristics such as the individual's level of cognitive functioning, capacity for functional communication, and the severity of social impairments. Professionals share their expertise with families as they collaborate to identify intervention priorities. For young children and other individuals with cognitive impairments, a principal focus of intervention often is the development of communicative intent and functional communication, whether that is in the form of verbal language, sign language, or augmentative/alternative communication. Functional communication remains one of the strongest predictors of adaptive outcome for individuals with autism spectrum disorders across the lifespan (Prelock & Nelson, 2012). For school-aged children or other individuals who have acquired reasonable capacity for functional communication, attention typically turns to the acquisition of academic and social skills. The transition to adolescence and young adulthood critically involves identity formation and the acquisition of skills to become valued, contributing members of society.

Community context also is considered. For example, in a metropolitan area, ability to use public transportation may be directly related to increasing independence, while the same skill may be less relevant in rural communities.

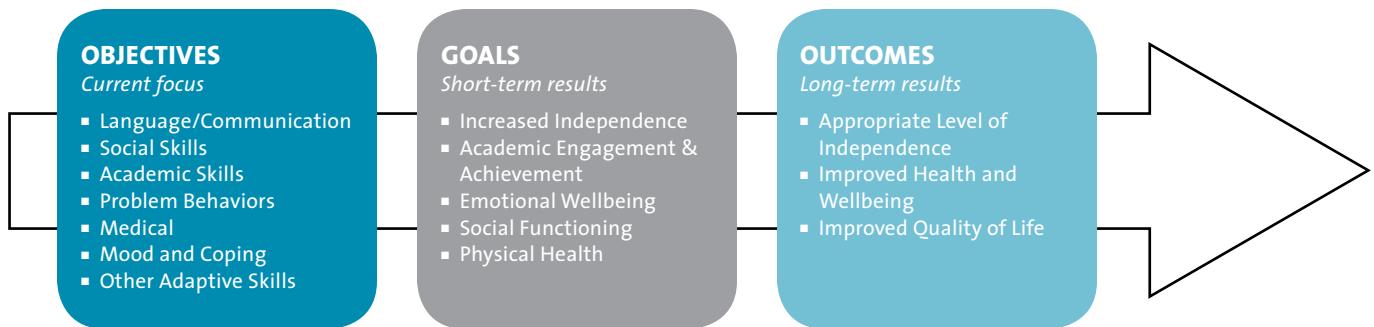
Intervention needs are discussed in terms of long-term outcomes, short-term goals, and current objectives. For some, it may be easiest to focus on specific skills or behaviors of concern that are addressed to meet short-term goals. Others may begin by thinking about long-term outcomes and work backward to identify the short-term goals that are needed to achieve the desired long-term results. Regardless of the sequence that is followed, at this stage in the intervention planning process, attention to current objectives and short-term goals is needed in order to select effective interventions to address those specific needs. It often is helpful to focus on goals to address outcomes that can occur in the next 6 to 12 months. In the education planning process, an Individualized Education Program (IEP) is typically written for one year. (Additional information on IEPs is provided later in the chapter within the discussion of Special Considerations in Public Education.)

Goals and objectives typically are identified in the following broad areas:

- improving core ASD symptoms in areas such as language, communication, play skills, social skills, or behavioral flexibility;
- decreasing or eliminating challenging behaviors such as intrusive stereotypic preoccupations or perseverations, self-injury, or aggression;
- improving academic engagement or achievement;
- accessing vocational or other services related to post-secondary transition; or
- addressing associated concerns such as attention problems, seizures, anxiety, sleep, or gastrointestinal symptoms.

SELECTING OBJECTIVES AND GOALS TO IMPROVE OUTCOMES

FIGURE 2.4



Note. Adapted from “Therapies for Children with Autism Spectrum Disorders,” by Z. Warren, J. Veenstra-VanderWeele, W. Stone, J. L. Bruzek, A. S. Namias, J. H. Feig et al., 2011, AHRQ Publication No. 11-EHC029-EF. Rockville, MD: Agency for Healthcare Research and Quality.

Intervention planning is enhanced when attention is given to developing goals and objectives that have the following characteristics:

- Assessment data are used as a starting point or baseline from which goals are identified.
- Goals clearly state what the individual will be able to do as a result of the intervention. Use of jargon or vague language is avoided.
- Goals are specific, measurable, and observable. This sometimes is referred to as “The Stranger Test” – anyone working with the individual should be able to interpret the goal.
- Goals are developmentally appropriate.
- Goals are relevant to the individual, family, and community context (sometimes referred to as social validity).
- Goals reflect purposeful individual behavior – they state what the individual will do rather than what they will not do.
- The number of goals is appropriate based on the individual’s unique characteristics, the setting, frequency of services, and other relevant variables.

Component Two. Select Interventions

Evidence-based practice provides a framework for selecting effective interventions based on the best available research, individual characteristics, and professional expertise. Families and professionals collaboratively review available research evidence to identify effective interventions that can address individual intervention goals and provide a good fit for other individual characteristics. For example, if improving conversation skills is identified as a goal, information about effective interventions, such as is provided in Chapter Three of this *Guide*, is reviewed to identify interventions that have been demonstrated to improve communication skills. Potential intervention options are further evaluated based on their fit with individual characteristics such as age, level of communication skills addressed, or availability in the community.

For each goal or objective in the intervention plan, the plan indicates the specific interventions that will be used to address that goal. Interventions are applied and combined in diverse ways to meet individual goals. For example,

- a comprehensive intervention may address multiple goals,
- a focused intervention may be used in isolation or in combination with other focused interventions to address a goal, or
- the same focused intervention or combination of focused interventions may be applied to different skills or behaviors to address multiple goals.

The intervention plan also describes who is responsible for implementing the intervention, including the role of parent or caregiver involvement, and provides other relevant details such as the intervention setting or frequency or duration of the intervention. (Appendix E provides a sample format for an intervention plan.) Required components of an intervention plan may vary based on specific requirements by providers, programs, funders, or settings. (In educational settings, when an Individualized Education Program [IEP] is developed, the plan documents special education services, related services, and any supplemental aids or services provided to enable the goals.)

Component Three. Determine Progress Monitoring Procedures

When an intervention is implemented, it is important for families and providers to determine whether the intervention is working. Intervention plans include an explicit description of the data collection procedures that will be used to monitor the individual’s progress in response to the intervention. Data from the initial assessment for intervention planning or other data collected prior to beginning the intervention serve as a baseline – the yardstick by which progress is measured. Comparison between baseline data and progress monitoring data helps families and providers determine if the intended changes in behavior are occurring.

If progress monitoring is not based on comparing pre-intervention and post-intervention data, then families and providers are really just guessing about the intervention effectiveness.

Progress monitoring procedures included in the intervention plan answer the following questions: What types of data will be collected, using what procedures, where, by whom, and how often?

The types of data used to monitor progress depend on the specific goal being monitored. It is important to establish procedures that will provide the kind of information needed to determine if an intervention is working. Some types of behavioral data that often are collected for progress monitoring purposes include data about frequency, duration, and latency of targeted behavior.

Different techniques may be used to collect data such as direct observation (e.g., continuous observation or time sampling), informant questionnaires, clinician-rated measures, self-report, self-monitoring systems, or other types of data (e.g., school behavior log or student products such as actual assignments).

It is important to use manageable techniques for collecting data; if procedures are too cumbersome, data may not be collected or the quality or usefulness of the data may be compromised. Emphasis should be placed on establishing systematic procedures that collect valid and reliable data. Validity means that the data collection procedures are actually collecting information that the data are intended to provide. Reliability means that the procedures produce consistent information. Some techniques that can help to produce high quality data include multiple baseline or alternating condition designs or reports from informants with no knowledge of the intervention.

When more than one intervention is used to address the same goal, it can be very difficult to make judgments about the effect of each individual intervention. Progress monitoring procedures may include plans for beginning interventions at different times or in a specific order to increase the possibility of collecting meaningful data and making informed decisions about each intervention.

STEP THREE. MONITOR PROGRESS

Interventions are implemented as detailed in the intervention plan. Progress monitoring procedures are followed to collect data to determine if the individual is progressing toward the intended goal. Data are used to determine if the target area is getting better, staying the same, or getting worse. Families and professionals use the data to make decisions about continuing, modifying, or discontinuing interventions, or introducing new interventions. Reasons for continuing an intervention or making changes are clearly discussed. Discussions include questions such as: If progress is noted, does the amount or degree of progress justify continuation of the intervention? Alternatively, if there is no progress or only minimal improvement, are there components of the intervention that need adjustment or is selection of a new intervention most appropriate?

Informed professional judgment is important in interpreting data, weighing risks and benefits, assessing interactions among different interventions, and evaluating factors that might be interfering with an intervention. It is important for interventions to be implemented for a long enough time period to allow them to produce intended results. The amount of time allowed before a change is expected varies, depending on the type of intervention and the nature of the improvement expected. (At times, an effective intervention may result in an initial increase in a problem behavior before a reduction begins to occur.) Professionals also assist in determining if an intervention is being accurately and consistently implemented. Environmental variables that may be interfering with the intervention are considered.

Graphing the data often makes it easier to interpret the data by facilitating comparisons and overall examination of increases or decreases in a target behavior or considering the rate of progress. Some interventions, such as those based on principles of applied behavior analysis (ABA), incorporate specific scientific strategies for graphing and analyzing data. During the progress monitoring phase, it is important for families and providers to be honest about any difficulties in implementing the intervention so that interventions can be modified or discontinued based on accurate information.

Interventions often require revision and adjustments to further tailor the intervention to a specific individual. Before an intervention is discontinued, families and providers consider: Are the goals stated clearly enough? Have the relevant variables been identified for determining if the intervention is working? Have all relevant experts been consulted? Has treatment integrity been assessed?

Progress monitoring in schools as mandated by federal disability laws follows many of the same principles that pertain to other settings. Some of the differences between progress monitoring in the educational system and progress monitoring in healthcare or other community based systems relate to the timing and frequency of monitoring. For example, under Part B of IDEA, a child's Individualized Education Program (IEP) will include a statement on how the child's progress toward the IEP annual goal is measured and when periodic reports on the child's progress toward meeting annual goals will be provided. The IEP is reviewed at least annually. A reevaluation to determine ongoing eligibility for special education services must be done at least once every 3 years. Under Part C of IDEA, the Individualized Family Service Plan (IFSP) is reviewed every 6 months and meetings are held once a year.

In addition to monitoring progress as specified in IEPs and IFSPs, many schools implement school-wide progress monitoring to ensure that all students, including those with disabilities, are making progress toward curriculum standards. Student academic achievement is measured for all students in the fall, winter, and spring of the school year. Some schools use general outcome measures, also known as curriculum-based measurements (CBM). Social and behavioral skill development is also measured through school-wide approaches. These data are used to determine if the educational programs provided at the school are effective. Participation in school-wide monitoring of progress toward general curriculum goals provides an indication for teachers and parents of how the student is progressing compared to non-disabled peers.

FAMILIES AND THE INTERVENTION PROCESS

Although there are many rewards associated with raising a child with an ASD, the challenges often are significant. When any member of a family receives a diagnosis of a disability, it impacts the entire family. Although families react differently based on their perspective and experiences, research has documented several ways in which families are impacted by an ASD diagnosis—for example, they often experience more stress, depression, and other negative health outcomes than parents of children with other disabilities (Waisman Center, 2008). At the same time, families play a critical role in implementing and coordinating interventions for the individual or child in their care. Research indicates that parent training and participation in implementation of specific interventions play an important role in improving outcomes (Drew, Baird, & Baron-Cohen, 2002; Ingersoll & Dvortcsak, 2006).

Throughout the intervention process, individuals with ASDs may require access to many different types of interventions provided by multiple providers in multiple settings. This aspect of the intervention process alone presents unique challenges for individuals with

ASDs and their parents and extended families. Families often report difficulties navigating the complex health and educational systems, and coordinating services across systems can be challenging. Parents make substantial efforts to understand the similarities and differences among systems and, at the same time, facilitate the sharing of information among them. Because coordinating communication among providers can be time consuming, it is often helpful to allow providers to speak directly to each other. To facilitate this communication, parents sign a “release of information” form that allows providers to share information. (See Table 2.1 for additional ideas for families to use to facilitate community collaboration.)

Another issue of great importance to parents is determining, when appropriate, who is qualified to work with their family member who has an ASD. In healthcare settings, often parents will ask providers about their experience in working with persons with ASDs and with individuals of the same age as their family member. Some parents regularly ask if the professional has a commitment to evidence-based practice. In addition, assessing the willingness of the provider to collaborate with other service providers with whom the person with an ASD has a relationship will be useful in determining whether the provider has the expertise to help the individual with an ASD reach his or her goals. In the educational setting, parents work closely with the child’s educational team to ensure that educators understand the strengths and concerns of their child during the school day.

Parents may have concerns about costs associated with intervention services and the various payment mechanisms. Beginning in January 2011, Missouri law mandated private insurance coverage of specific ASD intervention services for some types of private insurance. Parents are encouraged to contact their insurance provider to determine whether specific clinical services are covered. In the school setting, if the student is eligible for Part C of the Individuals with Disabilities Education Act (IDEA), known as First Steps in Missouri, the family may pay a monthly fee based on the family’s annual income and household size. If eligible for Part B of IDEA (i.e., special education services) or Section 504, the student will receive educationally relevant services through the school district. (At the end of this chapter, the *Guide* provides an in-depth discussion of the federal laws governing the education of students with disabilities in public schools, IDEA and Section 504 of the Rehabilitation Act of 1973.)

The Intervention Process Across Service Delivery Systems

The intervention process involves professionals representing multiple disciplines and multiple service delivery systems. Often these professionals are part of a network of services that includes healthcare, educational, and other service providers. Although all of these systems provide direct services to the person with an ASD and his or her family, the purposes of these systems differ. For example, medical services may be provided to address problems associated with ASDs such as mood disorders (anxiety or depression) or seizure disorders, and other healthcare services may address goals related to functioning across all types of environments. In contrast, public school services are focused on ensuring access to a free and appropriate public education (FAPE). Table 2.3 provides a brief overview of how the intervention processes differ across these systems. As discussed earlier, community collaboration is a core value of the Missouri Autism Guidelines Initiative; interagency and interdisciplinary collaboration with individuals with ASDs and their families promotes access to a range of high-quality interventions.

COMPARISON OF SERVICE DELIVERY SYSTEMS INVOLVED IN ASD INTERVENTION

TABLE 2.3

	HEALTHCARE SERVICES	
	MEDICAL	OTHER HEALTH PROFESSIONS
Focus of Intervention	Primary care providers may coordinate services to promote health and prevent disease. Individually or as part of a team, physicians and medical specialists (e.g., developmental-behavioral pediatricians, psychiatrists, and neurologists) may serve as the lead diagnostic clinician and assist families in coordinating services. Specialists may be consulted to treat associated medical conditions (e.g., seizure disorders, sleep disorders) and mood disorders (e.g., anxiety).	Individually or as part of a team, psychologists may serve as the lead diagnostic clinician and assist in coordination of intervention services. Psychologists, behavior analysts, and other health professionals such as speech-language, occupational, and physical therapists provide individual or group therapies to address a range of individual and family goals in areas such as health and wellness, problem behaviors, or skill development.
Funding	Public and private health insurance, self-pay, other public funding	Public and private health insurance, self-pay, other public funding At times, providers of behavioral and developmental services contract with the educational system to provide services.
Special Considerations (General)	Medications do not cure autism, but can be effective for treating associated conditions, including aggression and irritability, ADHD symptoms, and psychiatric symptoms (e.g., mood, anxiety, or psychotic disorders). Medications may be considered after behavioral therapies are tried given that medications may have side effects. In some cases, medications may be needed so that the individual can engage in and benefit from behavioral interventions. Medications combined with behavioral and developmental therapies may promote optimal outcomes.	Therapies may be provided through community-based agencies, individual providers, or healthcare systems. Therapies are provided across the lifespan; there are no age restrictions such as with the educational system. Individuals of all ages receive a wide variety of interventions.

	PUBLIC EDUCATION SERVICES		OTHER SERVICES
	MO FIRST STEPS (IDEA PART C) (Birth to 36 months)	SPECIAL EDUCATION (IDEA PART B) (Age 3 to 21 years or until high school graduation)	SECTION 504 OF THE REHABILITATION ACT OF 1973
	A family training and education system that provides coordinated services for children with developmental disabilities and their families. Services and supports focus on the child's routines, activities, and interests to increase the child's participation in family and community life.	To enable IDEA-eligible students to be involved in and progress in the general education curriculum in the least restrictive environment in academic and non-academic activities, participating with children who are non-disabled to the maximum extent appropriate, and to progress on the goals of the IEP	For any qualified person who has a physical or mental impairment that substantially limits one or more major life activities, the focus is to provide accommodations, modifications, services and/or related services to prohibit discrimination on the basis of the disability in academic and non-academic activities.
	State and federal funds, family cost participation based on ability to pay, public and/or private health insurance coverage for certain therapy services	Local tax base, state and federal funds, and public insurance (limited to Medicaid-approved services under Missouri state plan for Medicaid)	Multiple types of other service systems may be involved in providing interventions for individuals with ASDs including state-based agencies and programs, non-profit groups, or other community-based providers. Interventions focus on individual and family goals within the scope of the program or service. Services may or may not have age-related limitations.
	Infants and toddlers are eligible for services after confirmation of medical condition or developmental delay. To the maximum extent possible, services must be provided in the child's natural environment, such as the family's home.	A medical diagnosis does not automatically qualify a student under the IDEA. Parents are an important member of the IEP team, but the IDEA ultimately requires public schools to design and implement an IEP that offers some educational benefit (free appropriate public education-FAPE) to the student. Selection of appropriate interventions to enable the student to benefit from his education is made by teachers and therapists who serve the child with input from the parents.	There is no funding source. State and local jurisdictions must provide accommodations under Section 504 if they receive federal financial assistance.
		FAPE is the standard that must be met. An "appropriate" education means an education comparable to that provided to students without disabilities.	Public funding, self-pay, or other private funding sources. Some not-for-profit organizations have scholarships or grant funding available for services. Insurance reimbursement typically is limited to clinical providers, but may cover some other specific types of services particularly in the case of public insurance or waiver programs.
			Other service providers may be affiliated with many different types of organizations or agencies.

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COMPARISON OF SERVICE DELIVERY SYSTEMS INVOLVED IN ASD INTERVENTION

TABLE 2.3

	HEALTHCARE SERVICES	
	MEDICAL	OTHER HEALTH PROFESSIONS
Legal Considerations	Physicians, nurse practitioners, and physician assistants should be licensed and practice within the scope of their training and experience.	Providers should be licensed or supervised by licensed providers (e.g., psychologists, behavior analysts, speech/language therapists, occupational therapists, etc.) and practice within the scope of their training and experience. Recent legislation (§337.315, RSMo) specifies the legal requirements for BCBA to receive insurance reimbursement for services.
Intervention Plan	Medical Treatment Plan	Treatment or Intervention Plan

SPECIAL CONSIDERATIONS FOR SERVICE DELIVERY SYSTEMS

As indicated in Table 2.3, despite some similarities, the roles and responsibilities of healthcare providers, other service providers, and educators differ in important ways. Some of these differences can be accounted for by the following provider characteristics: education and training, professional credentials, experience with ASDs, and federal and state laws and regulations. Other differences pertain to the primary purpose of the system in which the professional is employed. Discussion of several of these unique characteristics pertaining to the intervention process across service delivery systems follows. For each of the systems discussed, a case example(s) is developed to illustrate some of the key concepts.

Special Considerations for Healthcare

The healthcare system includes organizations and independent providers in medical and other health professions. Professionals from a wide array of disciplines are involved in delivery of healthcare services such as primary and specialty physicians, nurses, psychologists, applied behavior analysts, speech-language pathologists, occupational therapists, and physical therapists.

Within the healthcare system, professionals are involved in the continuum of services for persons with ASDs from screening and diagnosis to assessment for intervention planning, implementation of interventions, and progress monitoring. Throughout the intervention process, medical and healthcare professionals work collaboratively with the individual with an ASD and his or her family and other members of the multidisciplinary team. Missouri best practice guidelines indicate that professionals have expertise in their own field and specific training and experience with ASDs (Missouri Autism Guidelines Initiative, 2010).

A collaborative, interdisciplinary effort represents the optimal approach to intervention planning and implementation. Specialists provide insight and recommendations relevant to their fields of expertise, and also are familiar with the theories and approaches of other

	PUBLIC EDUCATION SERVICES		OTHER SERVICES
	MO FIRST STEPS (IDEA PART C) (Birth to 36 months)	SPECIAL EDUCATION (IDEA PART B) (Age 3 to 21 years or until high school graduation)	SECTION 504 OF THE REHABILITATION ACT OF 1973
	Governed by Part C of the Individuals with Disabilities Education Act (IDEA). State requirements for licensure and certification apply to therapists and other providers as provided for in state regulations implementing First Steps (see State Plan for Part C of IDEA).	Governed by Part B of the Individuals with Disabilities Education Act (IDEA). State requirements for licensure and certification apply to teachers, therapists, and other providers of services and therapies. See state regulations implementing Part B of IDEA (see State Plan for Part B of IDEA).	Governed by Section 504 of the Rehabilitation Act of 1973; oversight by the U.S. Department of Education, Office for Civil Rights (OCR).
	Individualized Family Service Plan (IFSP)	Individualized Education Program (IEP)	Section 504 Plan or if the student is also identified under IDEA, the IEP under IDEA.

key disciplines so that integrated intervention strategies and programs can be developed. It is important to acknowledge both the unique expertise of professionals based on their area of specialty and their knowledge and experience related to or shared with other disciplines. For example, similar methodologies often are used across disciplines to promote learning and pro-social behaviors.

The scope of practice for medical and other health professionals is determined by state licensure requirements, other related regulations, and professional standards of care. Under some circumstances, funders of ASD intervention services also have an important role in defining the scope of practice for healthcare professionals. For example, the recent Missouri law that mandates private insurance coverage under some policies for specific ASD interventions also regulates the roles of healthcare professionals involved in covered ASD intervention services. Specifically, the law:

- defines a broad range of medical, behavioral health, and rehabilitative services that may be funded under the law;
- requires a treating physician or psychologist to prescribe the treatment and develop the associated treatment plan; and
- specifies the legal requirements for Board Certified Behavior Analysts (BCBAs) to receive insurance reimbursement for behavioral treatment services and defines the scope of practice for BCBAs, Board Certified Behavioral Analysts-Doctoral (BCBA-D), and Board Certified Assistant Behavior Analysts (BCaBA). (For additional information about this law, see Appendix D.)

During the intervention process, considerations arise that are unique to specific health-care professionals. The following discussion addresses special considerations for medical professionals, including issues related to the use of medications, as well as special considerations for other health professionals such as psychologists, behavior analysts, and speech/language, occupational, and physical therapists.

SPECIAL CONSIDERATIONS FOR MEDICAL PROFESSIONALS

Children with ASDs often have associated medical problems. These may include difficulties with motor coordination, metabolic disorders, sleep dysfunction, gastrointestinal complaints, nutritional deficiencies, obesity, and seizures. Primary care physicians may partner with other healthcare specialists (e.g., developmental-behavioral pediatricians, geneticists, neurologists, psychiatrists, dieticians) to develop a treatment plan for medical problems. These conditions often require medical testing and therapy including medications.

Medical providers promote access to behavioral and developmental therapies (e.g., ABA therapies, speech/language or occupational therapy, and augmentative/alternative communication devices) and may provide oversight for medication treatments and complementary and alternative medicine therapies (CAM). It is estimated that more than 50% of children with ASDs are taking either psychotropic or antiepileptic medications (Aman, Lam, & Collier-Crespin, 2003; Oswald & Sonankar, 2007). Levy, Mandell, Merhar, Ittenbach, and Pinto-Martin (2003) and Hanson et al. (2007) found that between 32% and 74% of persons with ASDs use CAM interventions.

Currently, there is no effective medication for core symptoms of ASDs, but medications are frequently used to reduce behavioral symptoms associated with ASDs such as hyperactivity, anxiety, aggression, and self-injury. Treatment of these symptoms with medications may greatly improve an individual's quality of life and increase the child's ability to benefit from other types of interventions at home, school, and/or in the community. When considering the selection of medications, physicians identify target symptoms in one of three domains:

1. Aggression/irritability;
2. ADHD symptomatology (includes inattention, impulsivity, and/or hyperactivity, whether or not out of proportion to what might be expected from severity of ASD symptoms); or
3. Symptoms of any co-occurring psychiatric condition, including:
 - Mood Disorder (often treatable with antidepressant or mood stabilizing medication)
 - Anxiety Disorder (often treatable with anxiolytic medication)
 - Psychotic Disorder (often treatable with neuroleptic medication).

As shown in the list of effective interventions in Chapter Three, only three medications have strong evidence that support their use specifically for individuals with ASDs (see Tables 37, 38, and 39, pages 112 to 114). Risperidone (Table 39), aripiprazole (Table 37), and methylphenidate (Table 38) target the first two domains described above—aggression/irritability and Attention Deficit Hyperactivity Disorder (ADHD) symptoms. Physicians and medical professionals use informed professional judgment as well as collaboration with the individual with an ASD (as appropriate) and his or her family to make decisions regarding use of medications. In some cases, behavioral interventions alone will result in positive outcomes. However, it must be emphasized that when irritability, aggression, or ADHD symptoms are present and left untreated, they may severely compound the functional impairments associated with ASDs (often in multiplicative rather than additive fashion); consequently, when such symptoms are treated, improvements may extend beyond the target symptoms to overall improvements in functioning. Moreover, an individual's capacity to benefit from additional psychosocial, educational, or behavioral interventions can be seriously compromised by these symptoms, and treating them effectively paves the way for higher responsiveness to those interventions.

Regarding the third domain of symptoms, co-occurring psychiatric conditions, it is unequivocal that other psychiatric conditions can co-occur with autism (Geschwind, 2011). Again, treating these comorbid conditions whenever they are present is as appropriate—if not more appropriate (given the sum total burden of disability)—for an individual with autism as for any individual affected by a treatable psychiatric condition.

MEDICATIONS: CONSIDERATIONS FOR MEDICAL, OTHER HEALTHCARE PROFESSIONALS, AND PARENTS

TABLE 2.4

When considering the selection of medications for persons with ASDs, physicians and other medical professionals* consider the following:	When considering the selection of medications for persons with ASDs, parents, caregivers, and individuals consider the following:
<ul style="list-style-type: none"> ■ Begin by talking with individuals and families about their experience(s) with ASD interventions. ■ Listen carefully and encourage families to talk about <i>all</i> services they are currently utilizing or considering, including off-label medications and complementary and alternative medicine (CAM) interventions. ■ Collaborate with other professionals in the community to assist individuals with ASDs and their families in accessing a full range of intervention services. ■ Emphasize the importance of behavioral interventions. Consider whether individual symptoms indicate an immediate need for use of medications. In some situations, it may be most appropriate to defer consideration of use of medications until attempts have been made to access other intervention services and supports. However, some children are unable to benefit from behavioral and other interventions and supports without the use of medications to decrease their symptoms of hyperactivity, impulsivity, and/or anxiety. In these cases it can be very useful to prescribe medication while introducing behavioral interventions, as long as the physician or healthcare professional is monitoring medication response closely along with the parents and treatment providers. ■ Discuss thoroughly the specific symptoms and/or co-occurring neuropsychiatric disorders being targeted, as well as potential risks and benefits. When use of multiple medications is considered, specific attention is given to the possible advantages and specific risks associated with this approach. Target symptoms (behavioral and affective/emotional) and methods of measurement should be identified to monitor effectiveness. Physicians and other healthcare professionals are aware of the limits of their professional expertise and only prescribe medications with which they are familiar and for disorders with which they have experience. When necessary, individuals and families are referred to specialists in the use of medications for persons with ASDs. ■ Monitor progress. The physician or other healthcare professional works with the family to develop a specific plan for monitoring the effectiveness of medication(s). The plan includes a specific agreement about monitoring procedures including what will be monitored, by whom, and the frequency of monitoring. Plans for follow-up visits are explicitly discussed. 	<ul style="list-style-type: none"> ■ Ask about the symptoms, behaviors, and/or disorders that the medicine might address, how long it will take the medicine to begin working, possible side effects of the medication, and when and how the decision will be made regarding whether or not the medicine is helping. Other important information for families includes the proposed dosage range of the medication, plans for dosage increase, and the time necessary for a dosage change to take effect. ■ Request written information about the medicine and inquire whom they should contact with any problems or worries. Parents might discuss with their clinician whether to tell the school about the medication as well as ways to explain the medication to the child and family members. ■ Ask if the medicine is helpful, how long will it be continued. Alternatively, parents may want to ask what happens if the medicine does not help or how quickly it can be stopped if they do not like the effects.

*In Missouri, only Medical Doctors (MDs) and Doctors of Osteopathy (DO) may prescribe Schedule 2 medications.

SPECIAL CONSIDERATIONS FOR OTHER HEALTH PROFESSIONALS

A range of other professionals are involved in providing health-related services for individuals with ASDs; these providers may be referred to as *other health professionals* and include professionals such as psychologists, behavioral analysts, and speech-language, occupational, and physical therapists.

Psychologists may serve as the lead diagnostic clinician (individually or as part of a multidisciplinary team) and provide a range of other ASD-related services including assessment for intervention planning; coordination of community-based services; developing comprehensive intervention plans; assisting in progress monitoring for interventions delivered by other professionals; and providing direct intervention services to individuals, groups, parents/caregivers, and families. Psychologists often are involved in providing the effective behavioral interventions discussed in this *Guide*.

Behavior analysts often play a significant role in the intervention process for individuals with ASDs. Behavior analysts are trained in the experimental or conceptual analysis of behavior and/or applied behavior analysis; they provide services to assess and improve socially important behaviors including design, implementation, evaluation, and modification of behavioral intervention programs. Interventions may include modifying environmental variables and making changes in interactions between an individual with an ASD and their family or other support systems. Many of the effective interventions discussed in this *Guide* reflect principles of applied behavior analysis and may be provided by behavior analysts as individual providers or as part of an intervention team. (For more information, see the definition of Applied Behavior Analysis in Appendix B.)

Other healthcare professionals, including speech-language pathologists and occupational and physical therapists, often participate in multi-disciplinary teams or provide individual assessment and therapy services. In healthcare settings, therapists address individual and family goals related to health and wellness, problem behaviors, and/or development of specific skills.

Healthcare Case Example

The following case example illustrates the importance of community collaboration to assure access to a full range of intervention services.

PEDIATRICIANS FOSTER COLLABORATION AND COMMUNICATION WITH OTHER COMMUNITY-BASED INTERVENTION SERVICE PROVIDERS

After her 4-year-old son, Billy, received a diagnosis of autism, Mrs. Jones decided to speak with her pediatrician to find out if medications would be helpful in improving her son's behavior.

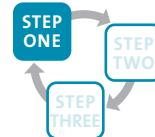
BACKGROUND:

Mr. and Mrs. Jones had multiple concerns about their son's behavior; Billy had difficulty controlling his emotions, seemed hyperactive, often appeared anxious, and was falling behind in his learning. His behavior sometimes upset other family members. Mr. and Mrs. Jones read information on the Internet about the use of medications for children with ASDs and scheduled an appointment with their pediatrician, Dr. White.

STEPS IN THE INTERVENTION PROCESS

Conduct Assessment

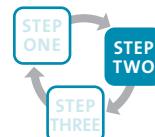
As Billy's pediatrician, Dr. White was familiar with Billy's overall health status and some of his parents' concerns. Billy was generally in good health. He had no history of seizures or other neurological symptoms. He had established a regular sleep pattern, and had no known allergies. Before the appointment with Mr. and Mrs. Jones, Dr. White read Billy's diagnostic evaluation report and reviewed the information provided about Billy's specific strengths and needs.



At the appointment, Mr. and Mrs. Jones described to Dr. White Billy's lack of a social response to playmates, tendency to have temper tantrums when he was distracted from his usual routine, and significant speech and language delays. Dr. White asked about Billy's participation in intervention services including any early intervention or special education services. Mr. and Mrs. Jones reported that Billy had not participated in any developmental, behavioral, or educational intervention services. Dr. White talked with Mr. and Mrs. Jones about their willingness and availability to participate in a behavioral intervention program.

Develop Intervention Plan

With sensitivity to and awareness of their level of concern for their son, Dr. White counseled Mr. and Mrs. Jones about evidence-based behavioral interventions for addressing Billy's specific needs. He explained that in Billy's case, his symptoms did not suggest the need for immediate use of medications; further, he indicated to Mr. and Mrs. Jones that medications typically are most effective when used in combination with well-designed educational and behavioral interventions.



Dr. White provided a referral to a qualified behavioral specialist and encouraged Mr. and Mrs. Jones to contact their local school district to determine Billy's eligibility for Early Childhood Special Education services. Dr. White assured Mr. and Mrs. Jones that within 3 to 6 months they would have a good idea about Billy's progress and could reconsider the need for and potential benefits of medication. The Joneses signed a release of information so that Dr. White could communicate with the professional(s) providing behavioral and educational intervention services.

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He indicated that he might consider referring them to an experienced pediatric neurologist, developmental/behavioral pediatrician, or child psychiatrist to prescribe and manage medications, particularly if Billy did not respond to medications or if multiple medications were needed.



Monitor Progress

Dr. White asked Billy's parents to schedule a follow-up meeting with him in 3 months to review Billy's progress. He encouraged them to contact him prior to that time with any questions. Dr. White provided Mr. and Mrs. Jones with resources about evidence-based ASD interventions, the types of services available in their community, and the availability of parent support groups. He encouraged them to review their insurance coverage to determine if their policy would cover medical treatment of autism and reminded them to contact the local school district. After the appointment, Dr. White's office faxed a referral to the behavioral specialist, as discussed with Mr. and Mrs. Jones.

Special Considerations for Other Service Systems

In addition to services provided by healthcare providers and educators, many other service systems support the needs of individuals with ASDs and their families (see Table 2.3). These services often go beyond services that educational or healthcare systems can provide and may include child care and respite, protection and advocacy, independent living and vocational support, residential care, and other family-to-family support services. Individuals with ASDs and their families select the other service programs and providers that best meet their needs. Referrals to other service agencies may be provided by educators or healthcare professionals.

Funding for community-based services comes from a variety of sources (public and private); waiting lists for public funding can be lengthy. Each funding source may have designated rules and regulations pertaining to the provision of services—for example, rules that govern who is eligible for services, which services are covered, who can provide the service, and for how long the service may be provided. In addition, limited resources often impact the capacity of other service providers to meet the needs of all eligible individuals.

Other Service Systems Case Example

This case example illustrates the use of multiple service delivery systems to provide ASD services.

SERVICE SYSTEMS FACILITATE TRANSITION FROM HIGH SCHOOL TO POST-SECONDARY EDUCATION AND EMPLOYMENT

Ty has been receiving special education services since first grade under Part B of the IDEA based on eligibility in the Autism category. He initially received special education services in self-contained programs in his early elementary years, but he became increasingly able to participate in general education settings with resource room support. During high school, he received minimal special education services and currently uses a “check in” system with the resource teacher, who keeps him on target with schedule changes and assignment due dates. As he approaches the end of his junior year in high school, Ty and his parents are preparing for the next scheduled IEP meeting when Ty’s post-secondary goals will be reviewed and progress discussed. As they plan for Ty’s senior year, they are looking forward to Ty’s experiencing more specific post-secondary activities.

BACKGROUND

Ty has no history of medical concerns except for a treatment-responsive seizure disorder that began during early adolescence. Ty has not had a seizure in the past 4 years. Recently, he has begun to show anxiety related to what is going to happen after high school. This anxiety has also included worries that he might begin to have seizures again. Ty is 17 years old, so his parents, Mr. and Mrs. Davis, are still his legal guardians; however, they are anticipating the time when Ty will become responsible for his own decisions with added supports. They have discussed different options with Ty’s educational team as part of the transition planning process that occurred initially in the IEP meeting prior to Ty’s 16th birthday. At that time, an exploratory transition plan was written as part of Ty’s IEP. Because Ty has difficulty understanding and predicting events in which he has no first-hand experience, the transition activities in Ty’s IEP have not been successful in diminishing Ty’s anxiety about the future.

Ty has completed some transition-specific activities with his school counselor, and during his senior year a vocational resource evaluator (VRE) and others, as appropriate, will be involved in assessing and exploring Ty’s areas of interest for post-secondary education or employment. Mr. and Mrs. Davis want Ty to enroll in a post-secondary educational program at their local technical school or at a community college. Ty is nervous about this idea and has begun to “shut down” when the topic is brought up to him. Although Ty likes the idea of having his own small apartment in his parents’ home, he is very ritualistic in his home routine and becomes anxious when staying overnight in an unfamiliar environment. Ty enjoys attending community events with his parents and occasionally goes to his older brother’s apartment for the day. He has friends at school but has not experienced community events with them outside of school activities.

STEPS IN THE INTERVENTION PROCESS

Conduct Assessment Develop Intervention Plan

Mr. and Mrs. Davis made an appointment with Ty’s pediatrician, Dr. Richman, when Ty began showing significant signs of anxiety at home, including perseverating on topics of conversation from his early educational career, refusing to discuss anything other than staying in school, engaging in excessive sleeping, and exhibiting loss of appetite. Dr. Richman found no medical reason for Ty’s anxiety and discussed possible alternatives to medication treatment. Dr. Richman explained that a psychologist could be helpful in assessing and monitoring Ty’s anxiety symptoms, consulting

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with the doctor about behavioral and/or medication treatment, and collaborating with the school to address concerns. A referral was provided to a local psychologist, Dr. O'Brien, who specialized in assessment and treatment of ASDs. After an initial consultation, Dr. O'Brien recommended follow-up with Ty's neurologist regarding fears about seizures and meeting with his school team and community support providers to update his transition plan. At the same time, Ty began participating in individual therapy to reduce anxiety symptoms, improve coping, and facilitate self-determination in transition planning.

Mr. and Mrs. Davis contacted his Process Coordinator at school and gave consent for Dr. O'Brien, a representative from Vocational Rehabilitation (VR), and Ty's Case Manager from the Department of Mental Health (DMH), Division of Developmental Disabilities (DD) service delivery system to be invited to the IEP meeting.

Ty received self-advocacy training as part of an earlier transition activity and was prepared to lead the IEP team meeting with assistance from his IEP case manager. Although Ty began the meeting with off-topic discussion about his friends and teachers, with guidance and encouragement he was able to express his anxiety in the form of questions about living on his own, holding down a job, and accessing community services. Although he expressed interest in continuing his education, he refused to discuss anything other than attending his current high school for his post-secondary education. It was agreed that this topic would be further explored with Dr. O'Brien in the context of individual therapy.

Ty's transition plan was revised to include a variety of "hands-on" experiences in addition to talking about various post-secondary options. The plan focused on the three areas Ty had expressed as his concerns: independent living, employment, and community services.

The revised transition plan included some visits to small group homes and supervised semi-independent living centers next to those homes. Ty was encouraged to begin to participate in activities at those sites. The VR representative agreed to conduct further assessment of Ty's work skills by setting up a skills assessment at simulated work stations based on his previously stated employment interests. The special education teacher agreed to find opportunities in the school setting for Ty to shadow custodial and lawn care workers. The VR representative volunteered to find at least two more job sites that Ty could visit. Because Ty expressed interest in helping others, possible volunteer opportunities for the upcoming summer were discussed. Ty was given the task of writing letters and/or making phone calls to inquire with the local Parks and Recreation center about volunteering. With encouragement from team members, Ty agreed to try staying at his brother's apartment overnight.

Ty discussed his concerns about a possible flare up of his seizure disorder with his neurologist, Dr. Santos, who reassured him that this would be unlikely, given how well-controlled his seizures have been on low doses of an anti-seizure medication. Ty and Dr. Santos developed a plan to address a possible flare up. These discussions resulted in a significant decrease in Ty's concern about this issue.



Monitor Progress and Provide Follow-Up Services

The team agreed that they would communicate by phone as planned activities were completed. Members of the team agreed to reconvene the IEP team at the beginning of the next school year. Until that time, Ty agreed to monitor his progress in achieving the identified goals by completing a satisfaction survey developed by the school counselor at the end of each activity. The psychologist would monitor Ty's anxiety symptoms and progress in developing coping skills.

Special Considerations in Public Education

INTRODUCTION

Two federal disability laws, the Individuals with Disabilities Education Act (IDEA) and Section 504 of the Rehabilitation Act of 1973 (Section 504), govern services to qualified students with disabilities in public schools.¹ Another federal law, the Elementary and Secondary Education Act, currently known as No Child Left Behind, requires the testing of every student in specified core academic subjects and the demonstration of adequate yearly progress.

For individuals who meet eligibility criteria, IDEA provides services to children from birth to 36 months of age under Part C of the Act and students age 3 years to 21 years or until graduation from high school under Part B of the Act. Infants and toddlers with a medical diagnosis (see text box) of an ASD are automatically eligible for services under Part C of IDEA. Students with a medical diagnosis of ASD may or may not meet the eligibility criteria under Part B of IDEA or Section 504 during some or their entire school career, depending on the challenges the student experiences in accessing and benefiting from the education program.

CLARIFICATION OF TERMS

Medical Diagnosis of ASDs vs. Categorical Labels Under IDEA

A frequent cause of confusion is the difference in the terms used by healthcare professionals when diagnosing ASDs and the terms used by educators when assigning categorical labels to describe eligibility criteria under the IDEA.

In Missouri, healthcare professionals who make an ASD diagnosis have Missouri licensure as a physician, psychologist, or other health or mental health professional with advanced training and clinical experience in the diagnosis and treatment of ASDs. In this *Guide*, the ASD diagnosis is referred to as a “medical diagnosis.”

Under the IDEA, educators in public schools determine an individual’s eligibility for special education services in one or more of the 13 categories mandated in the law, including the Autism category. A child who meets the criteria specified in the IDEA Autism category is eligible for special education services. Children who are eligible for special education in the Autism category may or may not have a medical diagnosis of an ASD. The type and amount of specialized instruction, programs, and services a child receives in the school setting are not dictated by the categorical label under which eligibility is established but rather are driven by the unique needs of the child.

The inaccurate practice of referring to eligibility for special education as an “educational diagnosis” has contributed to confusion about the differences between medical and educational classifications of ASDs. Healthcare professionals make ASD medical diagnoses and educators determine if children are eligible for special education services.

Although Part B of IDEA and Section 504 differ in eligibility criteria, purpose, and various regulatory requirements, each requires a review of existing data. These data, with parental permission, may come from an evaluation that resulted in the medical diagnosis of an ASD; from other prior assessments conducted by community providers; or from the child’s teacher(s), school records and reports, and the parents. The purpose of the review is to consider whether the data are sufficient to determine eligibility or whether additional assessment is needed to determine eligibility and make decisions about an appropriate educational program for the child. Because children act and react differently depending

¹ Section 504 also applies to private schools if the private school receives federal funding.

on the complexity and demands of the environment, it is frequently necessary to conduct additional assessment for programming purposes in the education setting. For both early intervention services (Part C) and services for school age children (Part B), on-going data collection is an important part of progress monitoring and continually informs necessary adjustments to interventions and programming to insure continuous progress.

Because Part C of IDEA, Part B of IDEA, and Section 504 differ in age, eligibility criteria, program goals, and regulations, school personnel need to work closely with families to help them understand differences in the laws particularly as their children age and transition from one program to another.

IDEA

The Missouri State Plan for Special Education contains all regulations that must be followed by all public school districts and other responsible agencies in the provision of special education services. The State Plan is the guide for implementation of federal regulations under Part B and Part C of IDEA. The State Plan contains specific steps, with timelines where applicable, that must be followed in the process of evaluation and assessment to determine eligibility for services. For children who meet eligibility criteria for Part B of IDEA, the Plan requires the state to provide special education services at no cost to the parents from the child's third birthday to a time when the child no longer needs special education services in order to receive an appropriate education or graduates from high school or is 21 years of age, whichever comes first. For children birth to 36 months who meet eligibility criteria for Part C of IDEA, the family may pay a monthly fee based on the family's annual income and household size.

Some of the terms common to special education services are related to the educational or special education program in which the student is a participant. Under Part C of IDEA, the student has an "Individualized Family Service Plan (IFSP)". Under Part B of IDEA, the student has an "Individualized Education Program (IEP)".

CHILDREN BIRTH TO THREE YEARS (PART C)

First Steps is Missouri's Early Intervention System for infants and toddlers who have delayed development or diagnosed conditions that are associated with developmental disabilities. Children with a medical diagnosis of an ASD are automatically eligible for services under Part C of IDEA. The First Steps program is family focused. Its goal is to provide families the tools they need to help their child be successful. In this way, infants and toddlers acquire important developmental skills, such as crawling, playing, talking, and eating. Services are provided primarily in the child's home.

The First Steps program includes a *service coordinator* who explains the program, schedules evaluations, and collaborates with the family to develop goals for the intervention. An Individualized Family Service Plan is developed. The *primary provider* works with the family to help them reach the identified goals—showing the family new ways to help the child learn and working with other members of the intervention team (for example, a physical therapist, occupational therapist, speech therapist, or special instructor).

Information specific to Missouri's First Steps program is available online. The First Steps homepage directs the reader to information on eligibility, parental rights, and parent resources. Service providers can use the website to refer eligible families to First Steps (<http://dese.mo.gov/se/fs/>).

CHILDREN IN SCHOOL (PART B—THREE TO 21 YEARS OF AGE OR UNTIL HIGH SCHOOL GRADUATION)

Key considerations in educational instruction have shifted in recent years. When most parents attended school, teachers focused on teaching curriculum according to their assignments; a third grade teacher taught the third grade curriculum, and a science teacher taught the science curriculum. Students passed or failed depending on their ability and effort to master the curriculum. Today, teachers teach students. Of course, there is still a curriculum to be mastered, but teachers are mindful of unique learning styles and needs of individual students and differentiate instruction and make accommodations in response to those factors. Additionally, curricula are expected to be research-based. As a result, there are children with autism and other disabilities who do not need special education services or who require fewer or less intensive special education services than might be expected.

For school-aged children, the special education process begins with the identification of children who may need special education services. School district personnel or parents request that a child be evaluated to determine if the child meets eligibility criteria for services under IDEA and, if so, the scope of related educational needs. The evaluation process is comprehensive and results in a profile of the child's abilities. A team of qualified professionals and the parents review the child's evaluation, and the team decides if the child meets eligibility criteria as defined by Part B of IDEA and the Missouri State Plan for Special Education.

If the child is found to be eligible, an Individualized Education Program or IEP (intervention plan) is developed, and parents and the team of qualified professionals meet to agree on the scope of the plan, including its goals. Among other required components of the IEP is a statement on how the child's progress toward annual goals will be measured and when periodic reports on the child's progress will be provided to parents.

Interventions are selected according to the unique learning needs of the student. Educators begin the intervention selection process with the end in mind—educational achievement. When selecting evidence-based interventions, teachers and other school personnel consider the following factors:

- the present level of academic and functional performance in the IEP,
- past data and learning history,
- the developmental age of the student and where the student functions with the greatest independence and learning efficiency,
- any past or current evidence-based interventions used by the family to address similar needs at home or in the community and the effectiveness of those interventions,
- goals in the student's IEP and the hierarchy of skills within each goal, and
- the environment (student-teacher ratio, complexity, structure, demands of the environment, etc.) in which the intervention(s) will be utilized.

This chapter outlines a three-step process to follow when making intervention decisions: conduct assessment, develop intervention plan, and monitor progress. These steps are recognizable in the mandated processes under Part B of the IDEA. Parents are members of the IEP team and have valued information to share about their child, including such information as the child's likes and dislikes and successful interventions that have been used in the past or are currently being used with their child at home or in the community. Parents help to make decisions about the goals to include in the IEP and may have suggestions for interventions. Under IDEA, decisions about the interventions selected to implement the IEP are ultimately the decision of school personnel; the IEP team carefully considers the wishes of the parent(s) and then uses the team's best collective judgment to make final decisions regarding interventions, which are typically not written into the IEP. If a parent disagrees with any of the decisions of the IEP team, several processes are available to initiate discussion of their concerns. The *Parent's Guide to Special Education* in

Missouri (www.dese.mo.gov) identifies parents' rights and responsibilities under the disability laws. It includes information about how to deal with conflicts (e.g., child complaint, due process, mediation) and provides in-depth information about preparing for and participating in the IEP process. Criteria for determination of eligibility, definitions of disabilities, special education placements, and available resources are also included in the publication.

Section 504

Section 504 of the Rehabilitation Act of 1973 prohibits discrimination based on a physical or mental impairment that substantially limits a major life activity. Any entity receiving federal funds of any type is required to provide protection against discrimination under this section. As it relates to education, frequently it is necessary to provide accommodations or modifications to the setting or education program to allow an eligible student to access education and receive free and appropriate public education (FAPE) without discrimination. It is sometimes described as "leveling the playing field" for students with disabilities. Even when accommodations, modification, or services are not necessary, an otherwise eligible student under the Act must still be afforded protection against discrimination. In this context, the term accommodation refers to teaching supports and services that a student may require to successfully access the curriculum. Examples of accommodations include taped books, additional time, oral tests, or preferred seating. Section 504 services are guided by the development of a 504 plan. (Several case examples follow to illustrate the differences between eligibility and services available through Section 504 and Part B of IDEA.)

Comparing Eligibility to Access IDEA vs. 504 Plans vs. General Education with Supports

In the educational setting, a student does not automatically qualify for or receive services, including any specific type of special education services, based solely on a medical diagnosis of an ASD. Special education services under IDEA are tied to a two-pronged test: (1) meeting eligibility criteria, including documented adverse educational impact; and (2) having a need for special education and related services in order to receive an appropriate education. Under Section 504, a qualified person must have a physical or mental impairment that substantially limits one or more major life activities.

A student with a disability could fall into one or more of three possible categories for services and supports in the educational setting:

- services under the IDEA;
- accommodations, modifications, or services under Section 504; or
- regular education with supports routinely available to all students in the general education setting.

A student's access to the general education curriculum and current functioning within the educational setting will drive the evaluation process to rule on eligibility and the need for specialized services and accommodations/modifications that go beyond those that are routinely provided to all students.

Most students with recognized disabilities fall under IDEA and receive special education and related services, as appropriate, such as speech/language therapy or occupational therapy. Some students meet eligibility criteria under Section 504 even though they do not meet special education eligibility criteria. These students generally require individualized accommodations and modifications to the regular curriculum. Other students do not require a service plan, as they are able to successfully engage in and make progress in the regular education curriculum with supports routinely available to all students in the general education setting.

The following short case examples describe these eligibility issues in greater detail.

CASE EXAMPLES COMPARING ELIGIBILITY

CASE EXAMPLE #1: ELIGIBILITY UNDER IDEA

Derrick is an 11-year-old boy with a medical diagnosis of ASD. He attends the 6th grade at his neighborhood public school.

Overview of school successes and concerns

Derrick has average intelligence, but his academic performance is below grade level. He appears to miss instruction in the large group format, and he has difficulty filtering out background noise and visual distractions. Derrick is most successful when instruction is embedded within predictable routines. When routines are altered, such as a change in the daily schedule to include an assembly, he exhibits behaviors of crying and yelling.

Derrick has difficulty navigating to locations in the school without getting lost. He is unable to tie his shoes and at times struggles with zipping his coat. Academic fine motor skills that require hand strength (such as opening a glue stick or using a stapler) and tasks that require manipulation (paper clips) can be difficult for Derrick.

Derrick frequently initiates social interactions indiscriminately with others. He does not pick up on social cues and teasing, and, as a result, has been influenced by other students to engage in inappropriate behaviors.

Need for supports and services in school

Derrick is not successful in the regular classroom even with individualized accommodations and modifications. His disability so adversely affects his education program that special education services are necessary. In this case, the student is identified as eligible for special education services under IDEA.

CASE EXAMPLE #2: ELIGIBILITY UNDER 504

Aiden is an 11-year-old boy with a medical diagnosis of ASD. He attends the 6th grade at his neighborhood public school.

Overview of school successes and concerns

Aiden generally earns all As and Bs on his class exams; however, he struggles with completing written assignments and, at times, refuses to complete them. When Aiden does complete written assignments, they are often illegible. In addition, although Aiden completes his assignments, he often forgets to hand them in for credit.

Socially, Aiden has a small group of peers he chooses to sit with at lunch. However, during educational tasks, Aiden has difficulty working in groups and prefers to work alone. He frequently dominates the discussion and has difficulty accepting input from peers. He becomes easily frustrated during group work when his ideas are not accepted, and he often shuts down, refusing to work.

Need for supports and services in school

Direct services are not required to support Aiden's access to the general education curriculum. However, Aiden does benefit from accommodations and modifications to "level the playing field" for his access to the general education curriculum. Aiden's social and written expression problems limit the major life function of learning;

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however, classroom accommodations/ modifications are sufficient to support his success in the regular classroom. In this case, the student is identified as disabled under Section 504. Classroom modifications/accommodations are provided that are not commonly made for most students in the classroom and, therefore, a 504 Plan is developed to outline the specific accommodations that will be made by school staff.

CASE EXAMPLE #3: NO INDIVIDUALIZED SERVICE PLAN REQUIRED

Michael is an 11-year-old boy with a medical diagnosis of ASD. He attends the 6th grade at his neighborhood public school.

Overview of school successes and concerns

Michael generally earns As and Bs in his general education classes, with the exception of his social studies class, in which he, and a good portion of the rest of the students, received a C.

Michael has difficulty keeping his assignments and due dates straight. He often does not write assignments in his planner until prompted to do so. Learning to use a daily planner is a goal for all 6th graders; therefore, the teachers prompt all students who are still learning the skill.

Socially, Michael has one friend with whom he chooses to sit and to eat lunch. With this familiar peer and with his teachers, Michael engages in reciprocal conversations with mutual, sustained enjoyment. He does not initiate conversations with unfamiliar peers, but politely responds to social overtures extended to him by less familiar peers. Michael independently extends the conversation when it is a topic of great interest to him. During educational tasks, Michael works cooperatively within a group of peers.

Need for supports and services in school

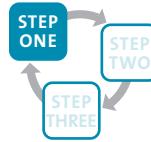
It is important for Michael's teachers to understand his medical diagnosis of ASD and his unique characteristics associated with it. With this knowledge, Michael's teachers can appropriately select simple accommodations so that Michael can function in the regular classroom with accommodations that are child specific but available for any student needing them in the class. He does not require specialized services or accommodations and modifications that go beyond those that are regularly available and/or provided for all students. In this case, the student is not identified as disabled in the school setting.

Case Examples Illustrating the Intervention Process in Public Education Systems

Three case examples illustrate the intervention process as it occurs in schools across Missouri. The case examples are organized by the three steps in the intervention process as presented in this chapter.

CASE EXAMPLE: STEP ONE. CONDUCT ASSESSMENT

MULTI-DISCIPLINARY TEAM ASSESSMENTS LEAD TO SELECTION OF NEW, EVIDENCE-BASED INTERVENTIONS FOR SPECIAL EDUCATION SERVICES



Karen qualified for special education preschool services at the age of 3 years under Part B of the IDEA non-categorical designation of Young Child with a Developmental Delay (YCDD). As she approaches kindergarten age, her Special Education Team observes new, more aggressive behaviors toward others and an increase in self-injurious behaviors. Karen's parents share similar concerns at home. Karen's teacher asks her parents if they have shared their concerns with Karen's physician, and they discuss the advantages and disadvantages of an additional medical evaluation.

BACKGROUND

Karen's parents, Mr. and Mrs. Cohen, call the school's case manager to tell her that they have taken Karen to her primary care physician and she has made a referral for a medical evaluation at a medical center that specializes in autism. Her school case manager requests that Mr. and Mrs. Cohen provide written permission for an exchange of information between the medical center and the school and offers to make copies of educational reports and behavior charts for the diagnostic team. The case manager volunteers to answer any questions from the medical staff about Karen's functioning and progress at school and to attend the meeting at which they summarize their conclusions. The case manager explains that the written permission for exchange of information will allow the medical center to provide the school with a copy of the medical report when it is complete and assures Mr. and Mrs. Cohen that any medical information will be considered when the school reevaluates Karen.

STEPS IN THE INTERVENTION PROCESS

Conduct Assessment and Determine Areas of Intervention Need

The medical team diagnoses Karen with autism. As a required component of the re-evaluation process under IDEA, the school team and her parents meet and review all existing data on Karen, including the medical report. With parental permission, the school team invites any medical staff to attend if they wish to help interpret the report. One of the evaluators on the medical team arranges to be present via a phone conference line. The physician summarizes the medical report and answers questions from the school team and Mr. and Mrs. Cohen about the specific characteristics of autism that Karen displays and the proposed medical treatment plan. There is discussion about what to expect over time in relation to school performance.

The educational team then considers if they need additional information as part of an educational evaluation to determine eligibility under a specific category of IDEA and to design an appropriate program for Karen. It is decided that a functional behavioral assessment (FBA) would provide valuable information about her new more aggressive behaviors toward self and others and help with the selection of appropriate interventions. The additional evaluation data are gathered and the educational team meets again with Mr. and Mrs. Cohen. After consideration of all the evaluation information, the educational team determines that Karen meets the eligibility criteria under Part B

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of the IDEA in the Autism category and continues to have a need for special education and related services. An evaluation summary is written that will be the basis for designing an Individualized Education Program, or IEP, for Karen.

Develop and Implement Intervention Plan

The IEP is developed at an IEP meeting by a team that includes Mr. and Mrs. Cohen as members. In preparation for the meeting, Karen's educational team considers her strengths and areas of need for intervention and reviews research on evidence-based practices that may be effective when addressing the behaviors of concern.

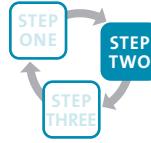
Mr. and Mrs. Cohen attend the IEP meeting where they contribute to the development of the IEP including assisting the education team in setting annual goals for Karen. Based on the goals and Karen's need for specialized instruction and support, the team decides on placement and services. Mr. and Mrs. Cohen share that Karen's physician referred them to a qualified behavioral specialist to assist Karen and the family with behavioral issues at home. The team discusses the evidence-based intervention techniques that the parents are currently using at home and the benefit to Karen of using some of the same intervention techniques at school. Karen's teachers discuss with Mr. and Mrs. Cohen additional evidence-based interventions that they will try based on Karen's unique characteristics and needs, designated goals, and past response to interventions.

Monitor Progress and Provide Follow-Up Services

Data collection methods are identified to gather information on an on-going basis to inform interventions and instruction and for progress reporting, which will be communicated to Mr. and Mrs. Cohen at least quarterly. The IEP will be reviewed and revised at least annually. Plans are made with Mr. and Mrs. Cohen to share progress at home on issues of mutual concern. In addition, phone conference calls are scheduled at regular intervals to share information and coordinate treatment among the physician, behavioral specialist, school team, and parents.

CASE EXAMPLE: STEP TWO. DEVELOP INTERVENTION PLAN

STUDENTS' NEEDS CHANGE WITH AGE, PHYSICAL AND PSYCHOLOGICAL DEVELOPMENT, EXPECTATIONS, AND ENVIRONMENTAL DEMANDS



Tom is eligible for special education services under Part B of IDEA as a student with a Learning Disability. He is 13 years old and during the transition from elementary school to middle school, he experiences a crisis. Tom is unable to keep up with his school work and several behavior problems are identified.

BACKGROUND

While in elementary school, Tom struggled academically. During elementary school, he was educated in the regular classroom for the majority of the school day and he received special education support to improve reading comprehension and organizational skills. He also left the regular classroom to receive additional special education services to assist him in learning to write legibly. Tom recently entered middle school and is experiencing a crisis because the environment is very different from elementary school. In elementary school, he had a relationship with one primary teacher and with the physical education and art teachers. His classmates remained constant throughout the day with the exception of his special education resource room. In contrast, in middle school, he has a team of teachers and the composition of his class changes as he moves from one teacher to another throughout the day. In addition, he must use a locker and manage a number of assignments with different expectations from each teacher.

STEPS IN THE INTERVENTION PROCESS

Conduct Assessment and Determine Intervention Needs

Tom's middle school case manager suggests conducting a re-evaluation to assess his current needs. His assessment team includes a member of his regular education team, his special education case manager, the district autism consultant, the speech language therapist, and an occupational therapist. After testing, observation, and information gathering, including an interview with Tom, the team meets with Tom's parents, Mr. and Mrs. Brady, to review the information. Based on the new information, the team concludes that Tom's needs would be better served under the label of educational autism. Several areas of concern are identified.

- Although not challenged by the academic expectations, Tom is frustrated as he tries to manage the work load—different teachers, classes, homework assignments, test dates, etc.
- Sensory sensitivity appears to be an issue for Tom, such as the noise level in the hallway when passing between classrooms and, at times, being bumped or rubbed against by other students in crowded hallways.
- Tom also experiences difficulty in less structured situations such as having lunch in the cafeteria. During lunch, students choose where to sit and the social conversation is not monitored closely or facilitated by an adult.

Mr. and Mrs. Brady are alarmed by the team's recommendation to provide services under the categorical label of autism and express their interest in obtaining a medical opinion. The school case manager encourages Mr. and Mrs. Brady to follow through with the medical appointment and offers to share the school's recent Evaluation Summary with the medical team.

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Review and Revise IEP Goals

The IEP team is convened. During the meeting, Mr. and Mrs. Brady report that they have contacted their primary care physician and scheduled a medical evaluation for Tom. The case manager explains that the IEP team will reconvene when the medical report is complete to consider any additional information. The IEP team then proceeds with reviewing and revising the IEP. The IEP team formulates additional goals in response to the recent re-evaluation. These goals specifically address organization and work completion, understanding of school rules and expectations, pragmatic language, and self-regulation of emotion and sensory input.

Several interventions are discussed that have been helpful for students with autism in the middle school and could be a good fit for Tom. These include a visual schedule of the week's routine placed on the front cover of Tom's notebook; a peer mentor to work with Tom to complete his daily assignment planner, teach him how to use his locker, and accompany him to lunch; a map of the building with his classrooms clearly marked; early release from each class so that Tom can proceed to his next class before the halls become congested and the noise level too intense; and a favorite teacher to be designated as his primary resource and "go to" person for support.

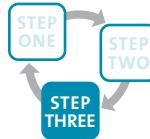
Monitor Progress

A system of positive behavioral supports is developed to address self-regulation, organization, and work completion, with Tom charting his own progress toward the goals. Tom contributes ideas for rewards for progress toward his goals, and Mr. and Mrs. Brady decide to use the same charting and reinforcement system at home to increase chore completion and self-regulation of behavior.

The case manager explains how data will be collected on progress toward the goals and offers to keep Mr. and Mrs. Brady informed about any changes to the interventions based on Tom's response and progress during the course of implementing the IEP.

CASE EXAMPLE: STEP THREE. MONITOR PROGRESS

IEP TEAM WORKS COLLABORATIVELY TO UPDATE INTERVENTION STRATEGIES



BACKGROUND

Henry is a four year old with developmental delays that meet the eligibility criteria for special education services under Part B of the IDEA. He has a medical diagnosis of ASD and is currently receiving services in an intensive preschool classroom for half a day and then in an integrated preschool classroom the other half of the day. He also receives speech/language and occupational therapy services. His integrated classroom preschool teacher has concerns regarding Henry's difficulties with transitions, wait time, and free play. During these situations, he often yells, cries, and refuses to comply with directions. Most troubling, he often walks around the classroom and becomes physically aggressive with other children during these situations.

STEPS IN THE INTERVENTION PROCESS

Conduct Assessment

Henry's special education teacher convenes an IEP meeting with his mother, Ms. Lee, his preschool classroom teachers, the speech pathologist, the occupational therapist, and the district's autism consultant. They discuss the behaviors Henry has been exhibiting in the integrated classroom.

The team discusses possible reasons why the same behaviors are not occurring in the intensive preschool classroom as in the integrated classroom. For example, the integrated preschool classroom has a greater number of children both with and without disabilities. Because there are more children in the integrated preschool class, activities take longer for everyone in the class to have a turn. Also, in the integrated classroom, the children who are typically developing use language in social play and in communicating their wants and needs. Henry has difficulty with reciprocal interactions and with expressing his wants and needs verbally; instead he responds with physical aggression when he cannot communicate or appears to be frustrated.

Ms. Lee has expressed concern that her son will be labeled as a "bad kid" and wants to improve his behavior in the integrated classroom prior to Henry's entry into kindergarten the following year.

Develop Intervention Plan

After the team decides that the data they gathered were sufficient to make decisions regarding Henry's IEP, they review the current IEP goals. An existing goal in the area of expressive language is deemed adequate but requires additional intervention strategies for Henry to meet the goal in the integrated classroom. The team writes two additional goals to incorporate into the existing IEP: one to address his aggressive behaviors, and one to address generalization of play skills.

The team discusses evidence-based behavioral intervention strategies that have been used successfully with Henry in the past, and evidence-based interventions and other strategies that can be used currently to shape his behavior. Ms. Lee shares information about interventions currently being utilized successfully at home when Henry becomes frustrated and yells, cries, or is aggressive toward his sibling.

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The team discusses positive behavioral support strategies that can be used with the entire class and strategies that can be applied uniquely to Henry. The occupational therapist and speech therapist discuss how they can integrate interventions across both therapies to address the new concerns. Interventions are selected based on this information and plans for implementation are finalized.

Monitor Progress

Data collected on behaviors observed prior to the IEP meeting are identified as baseline data. All members of the team agree to collect data to monitor the effectiveness of the new interventions in reducing Henry's target behaviors. In addition to the quarterly schedule for reporting progress to his mother, the teacher agrees to report to Ms. Lee by email once a week for the first month. Similarly, Ms. Lee will collect information on her observations of behavior change. The team agrees that a functional behavioral assessment (FBA) will be conducted if no improvement is observed within a specified period of time.

TRANSITIONS BETWEEN DELIVERY SYSTEMS

Transition is a term used to describe movement from one stage of life to another or passage from one place to another. The term is common among multiple disciplines including medical and healthcare professionals, educators, and other service providers. Times of transition can be especially stressful and challenging for children and young adults with ASDs and their families. Awareness of potential issues, knowledge regarding information and resources, and advance preparation can help to reduce stress and facilitate a successful transition.

Medical and Healthcare Issues

The transition process from childhood to adulthood involves multiple dimensions including the need for appropriate healthcare services. Healthcare transition is defined as the purposeful, planned movement of adolescents and young adults with chronic conditions from child-centered to adult-centered care (Blum et al., 1993). This transition is impacted by different cultures within the pediatric and adult healthcare systems. The child-centered system is based on family-centered practice and a Medical Home Model which stresses the importance of a relationship with a primary care practitioner who partners with the child and family to assure that their medical and non-medical needs are recognized and managed appropriately. Other services, including medical specialty care, often involve center-based multi-disciplinary teams, school and community-based interventions, and private or government-funded healthcare services. Generally, these services are accessible and available across the state. In contrast, in the adult-oriented system of care, patient-physician relationships are typically one-to-one and problem focused. In addition, there is less expertise in chronic childhood conditions, there are fewer multi-disciplinary teams of providers and fewer educational and community supports, and access to health insurance coverage is more variable.

Healthcare transitions are most effective when preceded by collaborative discussions involving the healthcare providers, patients and their families, and when these conversations begin years before the anticipated transition. An analysis of the National Survey of Parents of Children with Special Healthcare Needs identified the key components of successful healthcare transitions for adolescents and young adults as (a) encouragement for the patient to take as much decision-making responsibility as possible at each developmental stage, (b) practical information on available adult services, (c) guidance on recommended adult health-care providers, and (d) information relating to expected changes in health insurance (Lotstein et al., 2009). This same study noted the high frequency of failure to

meet these goals indicating that nearly 60% of parents/guardians reported that their transition process failed to meet the expected four core measures for transition. In this survey, only 42% reported a discussion regarding the shift of care to an adult provider and 34% had discussed changes in health insurance.

Specific recommendations and a Roadmap for Transition for Individuals with ASDs, including health and safety issues, can be found at <http://asdtransition.missouri.edu/index.html>. Further information pertaining to the broader group of children with special healthcare needs is also contained in additional references (American Academy of Pediatrics, 2002; Burdo-Hartman & Patel, 2008; Michaud, Suris, & Viner, 2004).

Educational Transitions

Transitions within the educational system vary in number and complexity depending on individual child factors as well as community-specific factors. Depending on the child's age at the time of a disability diagnosis and eligibility for services, many children will encounter two major transitions: (1) transition from First Steps services (Birth to 36 months, Part C, IDEA) into preschool services within a public school (age 3 to 5, Part B, IDEA) and/or K-12 services (Part B, IDEA), and (2) transition from high school to adult living.

For many parents, the transition from First Steps into pre-school services (Part B, IDEA) at the age of 36 months is the first major transition. Many parents find this transition challenging because of the significant differences between Part C and Part B under the IDEA. Differences include the focus of the program from a family-centered and family outcome driven system to an educational focus and educational outcome driven system and from family routines and activities under Part C to a free appropriate public education (FAPE) standard under Part B. Changes in the IDEA over the years have sought to improve the transition processes. According to the Missouri Office of Special Education website, the State of Missouri has developed policies and procedures to ensure smooth and effective transitions from Part C to Part B. These policies and procedures are detailed in the MO State Plan for Special Education: Regulations Implementing Part C (<http://dese.mo.gov/se/fs/>). Given that an infant/toddler is in the First Steps program for such a relatively short period of time, transition planning from First Steps is an important part of the discussion at each Individualized Family Service Plan (IFSP) meeting regardless of the age of the child. Parents can help to facilitate the process by giving permission for their child's information to be shared with the public school district 6 to 9 months prior to the child's 3rd birthday to allow for sufficient advance planning, including eligibility determination for Part B services.

The second major transition that occurs for all students is the transition from school to adult living. This occurs at graduation from high school or at the age of 21 for some students with disabilities. Depending on the student's preferences and interests, this transition could be to post-secondary education, employment, or adult services. Planning for this significant transition is a required component of the IDEA and becomes part of the IEP process at the age of 16 or sooner, depending on the needs of the student. It is a requirement for the student with a disability to be invited to the IEP meeting when the meeting's purpose is to consider post-secondary goals. The parent or student of majority age can positively impact the planning process for post-secondary transition by providing consent for the public school to invite to IEP meetings representatives of agencies responsible for providing for or paying for transition services.

Section 504 of the Rehabilitation Act of 1973 is broader in scope than IDEA, extending protections against discrimination on the basis of disability to eligible persons attending, employed by, or served by any institution or agency that receives federal funds. However, under Section 504, there are no specific requirements related to transition or post-secondary transition planning. Therefore, only if the student is also a student identified under

IDEA and under an IEP will post-secondary transition planning and courses be formally addressed. Students with a 504 Plan or an IEP who are transitioning from public school to post-secondary training or an institution of higher education may benefit by checking in advance with a school administrator regarding 504 policies in place on campus.

In addition to the two major times of transition mentioned above, there may be one or more additional transitions that could potentially present significant challenges. For many children, moving from elementary school to middle or junior high is one of those difficult transition periods. The complexity of the school environment is one factor to consider. Frequently, students move from one primary classroom teacher with one set of classmates to a school where students move from class to class on an hourly basis, which may involve a different set of peers in each setting. Styles of classroom management, structure, and expectations may differ greatly from class to class. Frequent movement in crowded and noisy hallways can add to the stress of the situation. For many students, learning to operate a locker combination and to manage the transfer of materials can be an overwhelming process, especially when time between classes is short. This transition frequently occurs as the student is experiencing significant changes in his or her body: hormonal changes, growth spurts, and emotional highs and lows. It is critical for students with ASDs at these times to have a supportive team of adults and peers to anticipate, observe, listen, and problem solve alongside the emerging adolescent. A multi-disciplinary team collaborating and strategizing across delivery systems can be a very necessary and effective support system to help the student with an ASD and his/her family through difficult transition periods.

Transition from School to Adult Services

Connecting with the providers of adult services early and understanding eligibility requirements and available service options are key to the facilitation of smooth transitions. For example, the vocational rehabilitation (VR) counselor can become actively involved in planning for the student's employment before the student leaves the school setting. Eligibility for services will need to be determined according to VR criteria to establish employability. Information regarding VR eligibility can be found at <http://dese.mo.gov/vr/dd.htm>.

Some individuals need more support than others for community living. In fact, some may need specific planning and instruction to learn the skills for home living, such as cooking and cleaning, travel and transportation, money management, and socialization. Centers for Independent Living, the Missouri Division of Developmental Disabilities Regional Offices, and Developmental Disabilities Senate Bill 40 Boards provide eligible individuals with supports and services in the area of daily living skills, residential supports, and transportation. Information regarding eligibility through the Division of Developmental Disabilities can be found at <http://www.sos.mo.gov/adrules/csr/current/9csr/9c45-2.pdf> and at <http://dmh.mo.gov/docs/opla/ServicesBrochure0210.pdf>. Additional information regarding various adult services is available at "A Roadmap to the Future: Transitioning to Adulthood with ASD" <http://asdtransition.missouri.edu/index.html>.

Transition Case Example

The following case example describes the transition from services provided under IDEA Part C (First Steps) to IDEA Part B (Early Childhood Special Education)

CASE EXAMPLE: TRANSITION

Max is a 28-month-old boy who presents with developmental delays in the areas of communication, social/emotional, and adaptive skill development. Although a diagnosis of autism spectrum disorder is suspected, his primary care physician chose not to diagnose him when Max's parents shared their concerns during Max's 24-month checkup.

BACKGROUND

Max and his family have been participating in the First Steps Early Intervention Program (IDEA Part C) since he was 12 months old. He is seen two times weekly in his home for developmental therapy and one time monthly for occupational therapy. Max and his family have grown close to his First Step providers. They have not only provided valuable input and strategies related to Max's development, but have also provided emotional support to his parents and, at times, to his extended family.

STEPS IN THE TRANSITION PROCESS

Max will be turning 3 years old soon, and he will be aging out of the First Steps Program. Six months prior to his 3rd birthday, his First Steps Service Coordinator sets up a transition meeting to begin the process of eligibility determination for IDEA Part B, Early Childhood Special Education program. Max's parents, Mr. and Mrs. Weber, understand that participation in the Early Childhood Special Education program is voluntary but they feel that it will be important for Max's future success.

At the transition meeting, Mr. and Mrs. Weber are introduced to representatives from the public school. This is an opportunity for Max's parents, as well as his First Steps Service Coordinator and service providers, to share information about Max's strengths and concerns with public school personnel. It is also an opportunity for the public school representatives to explain how children qualify for special education services through their school district because participation in First Steps does not ensure qualification for the Early Childhood Special Education Program.

For Max to qualify for special education, he must meet eligibility criteria as set forth in the IDEA and Missouri State Plan for Special Education in either an IDEA category of disability or as a Young Child with a Developmental Delay. The disability determination must include recognition that the disability has an adverse educational impact on Max's ability to learn. There are significant differences between the First Steps Model (focus on family-centered services delivered at home) and Part B of IDEA (school based with an emphasis on educational success). Mr. and Mrs. Weber express concern that if Max qualifies for services, they will have less input into Max's development. They are assured that they are an important part of the IEP (Individualized Education Program) team. If at any time they have concerns, either the Process Coordinator, special education teacher, or the entire IEP team can be assembled for a meeting.

During the transition meeting, Mr. and Mrs. Weber sign release forms to give the school representatives permission to receive records and medical information from community providers working with Max and his family. The school representatives

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establish that further testing is required to determine eligibility. Mr. and Mrs. Weber receive a copy of the Procedural Safeguards Notice detailing rights of parents and children under the IDEA. The rights, in part, state that parents must give their written consent for school personnel to evaluate a child under IDEA. At the meeting, Mr. and Mrs. Weber are asked to sign a Consent to Evaluate form. School staff arrange to call Mr. and Mrs. Weber over the following 2 weeks to schedule evaluations.

After all evaluations are complete, the team meets with Mr. and Mrs. Weber to discuss the results. At the meeting, Max is determined to be eligible for services under the IDEA as a Young Child with a Developmental Delay. The speech pathologist asks Mr. and Mrs. Weber if they have discussed Max's developmental delays with his pediatrician. Mr. and Mrs. Weber respond that they have done so and that the pediatrician was reticent to diagnose Max with a specific disorder because of his age. The autism specialist who attends the meeting shares information about autism spectrum disorders with Mr. and Mrs. Weber and provides them with literature. She encourages them to discuss the literature with Max's pediatrician and to consider asking him for a referral to an autism center for a diagnostic evaluation, if Mr. and Mrs. Weber and the pediatrician feel it is warranted.

Mr. and Mrs. Weber and the other team members decide on a mutually agreeable time to reconvene to write the IEP. Mr. and Mrs. Weber request that Max's First Steps providers be invited to the IEP meeting. The IEP Case Manager sends out a written notice regarding the IEP meeting, including to Max's two First Steps providers. The occupational therapist is able to attend the IEP meeting.

During the IEP meeting, Mr. and Mrs. Weber participate fully as members of the IEP team and assist with the development of the IEP. The team develops long- and short-term goals for the school year and determines the specific services Max will receive, including the amount and frequency of the services. These services include specialized instruction, occupational therapy (OT), and speech and language therapy. Mr. and Mrs. Weber request that self-help skills be addressed in the goals, which include skills that are important for both home and school. The OT and speech language pathologist discuss how they can assist with addressing self-help skills in their therapy sessions with Max. The team discusses evidence-based interventions that will help Max progress toward the goals in the IEP. The First Steps OT shares information about specific interventions that were successful with Max in the past. The school team members offer to include Mr. and Mrs. Weber in some training opportunities so that skills can be practiced and reinforced in the same manner at home. Mr. and Mrs. Weber are pleased that they will receive quarterly reports on Max's progress towards his goals and daily sheets detailing what Max did during his school day. They offer to email Max's teacher and therapists on a weekly basis with home progress reports.

Max's 3rd birthday does not occur during summer break; therefore, he is eligible to begin Early Childhood Special Education services on his birthday. Max and his parents are preparing for this transition by talking about his new school and have even gone to the school to take pictures. Every day, Max and his parents look at the pictures and talk about his new school. By all indications, Max will make a smooth transition to school.

Research Findings

CHAPTER 3



CHAPTER 3

Introduction

This Guide presents evidence-based practice as a framework for intervention decision-making (Figure 3.1) that results in selection and implementation of interventions that are most likely to be effective for a specific individual with an autism spectrum disorder (ASD). This chapter focuses specifically on research findings as one component of evidence-based intervention. To present the best available research evidence in a format that is accessible for use in intervention planning by families and professionals, the chapter synthesizes the findings of six recent nationally recognized systematic reviews of research on ASD interventions. The research findings in this chapter are not intended for use in isolation, but rather for consideration in the context of individual characteristics and professional expertise as described in Chapter Two.

EVIDENCE-BASED PRACTICE

FIGURE 3.1



Importance of Systematic Reviews

This *Guide* focuses exclusively on data from systematic reviews of research on the effectiveness of ASD interventions. Systematic reviews are the foundation of evidence-based practice because they focus attention on the strengths and limits of available research evidence about the effectiveness or safety of an intervention. Compared to individual research studies, systematic reviews provide unique advantages in terms of the comprehensiveness, quality, and strength of their conclusions. Systematic reviews collate, analyze, and synthesize all available research studies on a specific topic. Criteria are established to evaluate each individual study so that conclusions about effectiveness are based on high quality research. Emphasis is placed on research studies that make comparisons between different interventions, use control groups, or both.

This chapter provides an overview of six nationally recognized systematic reviews and presents a synthesis of their findings developed by consensus of members of the Missouri Autism Guidelines Initiative.

The chapter is organized as follows:

- Introduction
- Importance of Systematic Reviews
- Overview: Six Systematic Reviews 2009-2011
- Cross-cutting Implications
 - Challenges of Drawing Conclusions Across Reports
 - Methodology to Identify Effective ASD Interventions
- Effective ASD Interventions
- Ineffective ASD Interventions
- Harmful ASD Interventions
- Other ASD Interventions
- Need for Additional Research
- Looking Ahead Toward New Research
- Description of Effective ASD Interventions

Overview: Six Systematic Reviews 2009-2011

A search of available research resulted in identification of six recent nationally recognized systematic reviews that were selected by the Initiative as the focus of this Guide to provide up-to-date information on the effectiveness of a broad array of ASD interventions. Detailed summaries of the reviews are provided in Chapter Four of this Guide including citations for accessing the full text of each review. Table 3.1 provides a listing of the six reviews. The abbreviations noted are used to identify the reviews in the charts and discussion presented in the remainder of this chapter and throughout the Guide. As indicated in the table, the reviews were sponsored by nationally recognized organizations including federal government agencies, nonprofit organizations, or academic institutions.

THE SIX SYSTEMATIC REVIEWS			TABLE 3.1
NAME OF REVIEW	AUTHOR/SPONSORING ORGANIZATION	ABBREVIATION USED IN GUIDE	
<i>Evidence-based Practices in Interventions for Children and Youth with ASD</i>	National Professional Development Center	NPDC	
<i>ASD Services, Final Report on Environmental Scan</i>	IMPAQ on behalf of the Centers for Medicare and Medicaid Services	CMS	
<i>National Standards Report</i>	National Standards Project sponsored by the National Autism Center	NSP	
<i>Therapies for Children with ASD</i>	Vanderbilt Evidence-based Practice Center on behalf of Agency for Healthcare Research and Quality	AHRQ	
<i>Management of Symptoms in Children with ASD: A Comprehensive Review of Pharmacological and Complementary-Alternative Medicine Treatments</i>	Stanford Autism Research Team	StART	
<i>Evaluation of Comprehensive Treatment Models for Individuals with ASD</i>	Odom et al. in Journal of Autism and Developmental Disorders	CTM	

Table 3.2 provides an overview of the six systematic reviews in terms of the focus of the interventions reviewed, the age range of individuals receiving intervention, the number and publication dates of research studies included in the reviews, the classification system used to rank interventions, and a brief summary of the effective interventions identified by each review. Only one review, CMS, includes data on effective interventions for adults with ASDs.

Although the terminology differs, the types of interventions summarized in the reviews can be described using two broad categories: (1) medical and complementary and alternative medicine (CAM) interventions and (2) behavioral interventions. Medical and CAM interventions are based on introducing or restricting the intake of external substances, or physical manipulation; examples include medications, supplements, special diets, and massage. Behavioral interventions improve individual functioning by modifying the environment (e.g., making physical changes in the environment, interacting or reacting to an individual in a specific way, or teaching a new skill). The broad category of behavioral interventions includes interventions that may be described as educational, academic, social, psychosocial, or psychological. Behavioral interventions are also described as either focused or comprehensive. Focused interventions are individual strategies, used alone or in combination, to address specific skills or behaviors (e.g., the use of positive reinforcement to increase vocalizations), whereas comprehensive interventions are a set of procedures or programs designed to address a broad array of skills or behaviors (e.g., structured teaching to enhance learning). For additional information on the types of interventions considered by each review, please refer to the review summaries in Chapter Four and/or the Glossary in Appendix B.

OVERVIEW OF SYSTEMATIC REVIEWS

TABLE 3.2

	NPDC (2010)	CMS (2010)	NSP (2009)
Focus	Focused Intervention Practices	Behavioral, Psychosocial Interventions	Educational and Behavioral Interventions
Age Range	Birth to 22 years	Children birth to 16 years; Transitioning Youth 17 to 21; Adults 21+	Below 22 years
# Research Studies Selected for Review	Approximately 360	271	775
Dates of Research Reviewed	1997-2007	1998-2008	1957-2007
Classification System	Evidence-based practices	Level 1: Evidence-based interventions Level 2: Emerging evidence-based interventions Level 3: Unestablished interventions	Established Emerging Unestablished Ineffective/harmful
Effective Interventions	24 Evidence-based practices	Level 1. Children (16 Evidence-based interventions) Level 1. Transitioning Youth (1 Evidence-based intervention) Level 1. Adults (3 Evidence-based interventions)	11 Established interventions

AHRQ (2011)	StART (2011)	CTM (2010)
Behavioral, Educational, Medical, Allied Health, Complementary and Alternative Medicine (CAM)	Pharmacological & Complementary and Alternative Medicine (CAM) Treatments	Comprehensive Treatment Models (CTM)
Children 2 to 12 years with ASDs; Children 0 to 2 years at-risk for ASDs	Below 22 years	Birth through 22 years
159	115	30 comprehensive treatment models
January 2000-May 2010	1994-May 2007	Early 1970s to 2009
Qualitative summary of research findings: quality of studies is rated as good, fair, or poor; strength of evidence is rated as high, moderate, low, or Insufficient.	Effective medical interventions Medical interventions with marginal evidence Ineffective medications Effective CAM interventions CAM interventions with marginal evidence	Treatment models were rated in six domains using a 6-point rating system (0-5): operationalization, implementation measures, replication, outcome data, quality of research methodology, and complementary evidence from other research.
Number of interventions with evidence of effectiveness: Behavioral: 1 behavioral intervention Medical: 2 medications Educational: none; insufficient evidence Allied Health: none; insufficient evidence CAM: none; insufficient evidence	Effective interventions: Medications: 2 effective medications CAM: none	Six CTMs had high ratings on four or more domains. Across CTMs, there were few randomized controlled trials (RCTs), although some models provided complementary evidence of intervention practices from single-case design studies.

Cross-cutting Implications

CHALLENGES OF DRAWING CONCLUSIONS ACROSS REPORTS

Drawing conclusions based on the results of all six systematic reviews is complicated by differences in their areas of focus, methodology, and resulting conclusions. It is important to keep in mind several factors that contributed to differences in findings across the reviews.

- **Focus of the Review.** Different types of interventions were included depending on the purpose and focus of the review. For example, the NPDC reviewed only focused behavioral interventions. The absence of NPDC findings for other categories of interventions, such as comprehensive behavioral or medical interventions, does not suggest anything about the level of research support for these interventions.
- **Dates of Literature Review.** The reviews used different beginning and end dates to determine what research studies were included. In some cases, a later beginning date may have excluded earlier research on specific interventions. For example, AHRQ noted that much of the research in support of TEACCH (also called Structured Teaching) was published prior to the start date for their literature review. Similarly, an earlier end date may have excluded more recent findings. For example, research supporting the use of aripiprazole for individuals with ASDs occurred after the end date of the StART review but was included by AHRQ.
- **Inclusion and Exclusion Criteria.** Each review established different rules for determining what research articles would be considered and how the quality or strength of the findings would be rated. For example, the AHRQ exclusion criteria likely excluded some research studies about ABA-type interventions that were included in other systematic reviews. Exclusion and inclusion criteria also reflected the varying purposes of the reviews and differences in the goals of the sponsoring organizations.
- **Classification System.** Some reviews used a continuous classification system; for example, NSP classified interventions as established, emerging, or unestablished. Other reviews used a dichotomous approach; for example, NPDC reported only evidence-based interventions. The standards for describing an intervention as established or evidence-based also varied across the reports.
- **Other Factors.** The systematic reviews vary in other ways that contributed to apparent differences in findings. For example, different strategies were used to organize interventions to be reviewed. The NPDC tended to identify separate interventions whereas the NSP and CMS reviews tended to group similar interventions into an overall category or package. Table 3.4 provides a cross-reference to the various intervention names used across the reviews to aid the reader in resolving variation in findings that primarily reflect semantic rather than substantive differences.

METHODOLOGY TO IDENTIFY EFFECTIVE ASD INTERVENTIONS

Analyzing and summarizing the data from the six systematic reviews is challenging because of the complexity of each review and variations across reviews. This Guide is the first document to present data on multiple systematic reviews of ASD interventions in a manner that is cumulative and cross-cutting. It is acknowledged that any summary of reviews with varying methodological approaches sacrifices some of the rigor and precision of the specific procedures used in each review. This Guide reflects the commitment of the Initiative to providing information on ASD interventions that is evidence-based, up-to-date, and accessible.

Despite the ongoing need for additional research and some variation in findings, the systematic reviews consistently indicate that available research evidence on ASD interventions shows promise in some areas. The term effective was selected by consensus of members of the Initiative to describe interventions ranked at the top level of research support by one or more of the systematic reviews summarized in this Guide.

Effective ASD Interventions

The list of effective interventions presented in Table 3.3 synthesizes the findings across the six systematic reviews; individual findings from each review are summarized separately in Chapter Four. The effective interventions include those described as Evidence-based (NPDC); Level One: Evidence-based (CMS); Established (NSP); having evidence of effectiveness (AHRQ); and/or as Effective Medications (StART).

The term effective indicates a high level of research support for a particular ASD intervention based on the findings of one or more of the six systematic reviews. However, the specific characteristics and needs of individuals with ASDs vary significantly; there is no one size fits all intervention for ASD. Therefore, a review of effective interventions must consider the characteristics of individuals who benefited from the intervention and the skills or behaviors targeted by the intervention. Information from the systematic reviews about the characteristics of individuals who benefited from each intervention is contained in the series of tables presented at the end of this chapter in the Description of Effective ASD Interventions (see pages 76-114); each table lists the age range, when available, of individuals who benefited from the intervention described in the systematic reviews. Additional information about the characteristics of the individuals for whom an intervention was shown to be effective, including specific diagnostic categories, is included in some of the systematic reviews (e.g., NSP) and can be found in the review summaries in Chapter Four. General information about the goal areas addressed by each intervention is provided in Table 3.6 in this chapter and in Appendix C. More detailed information about the specific goal areas for which interventions were reported to be effective is found in Chapter Four.

It is not the intention of this document to suggest what interventions should or should not be used for a specific individual with an ASD. Instead, the document emphasizes a process for intervention selection in which professional expertise and individual characteristics set the context for reviewing research findings.

Table 3.3 provides a list of effective ASD interventions identified in the systematic reviews. Interventions are presented alphabetically by category consistent with the other tables in this chapter; the order does not reflect ranking, merit, or preference. Throughout this chapter, effective interventions are grouped into two broad categories: (1) behavioral interventions and (2) medical and complementary and alternative medicine (CAM) interventions. Behavioral interventions are based on environmental modifications whereas medical and CAM interventions are based on introducing or restricting intake of an external substance (e.g., a medication or a special diet) or physical manipulation. The broad category of behavioral interventions includes interventions that may be described as educational, academic, social, psychosocial, and psychological. Behavioral interventions are described as either comprehensive (i.e., a program or set of procedures that addresses a broad array of skills or behaviors) or focused (i.e., an individual strategy used address specific skills or behaviors).

Additional information about the effective interventions is then presented in several formats in the tables that follow.

- Table 3.4 provides a cross-reference for behavioral intervention names used by the six systematic reviews to refer to the same or similar behavioral interventions.
- Table 3.5 presents information about how the relevant systematic reviews ranked the level of evidence for each effective intervention.
- Table 3.6 provides information about the general goal areas for which each intervention has been shown to be effective.
- At the end of this chapter, the section entitled Description of Effective ASD Interventions contains a series of tables about each effective intervention based on the findings of the systematic reviews and includes a definition and general description of the intervention, information about which reviews ranked it at the highest level of research support, the age range of individuals and the goal areas for which it was demonstrated to be effective, and references for accessing additional information about the intervention.
- Appendix C provides additional information about the general goal areas for which the effective interventions have been shown to produce positive outcomes according to each of the relevant systematic reviews.

EFFECTIVE ASD INTERVENTIONS		TABLE 3.3
BEHAVIORAL INTERVENTIONS		
Comprehensive Interventions*		
PROGRAMS OR SETS OF PROCEDURES THAT ADDRESS A BROAD ARRAY OF SKILLS OR BEHAVIORS.		
Comprehensive Behavioral Intervention Programs for Young Children		
Structured Teaching		
Focused Interventions		
INDIVIDUAL STRATEGIES USED ALONE OR IN COMBINATION TO ADDRESS A SPECIFIC SKILL OR BEHAVIOR.		
Antecedent Package		
Prompting		
Stimulus Control/Environmental Modification		
Time Delay		
Behavioral Package		
Differential Reinforcement		
Discrete Trial Training		
Extinction		
Functional Behavioral Assessment		
Functional Communication Training		
Reinforcement		
Response Interruption/Redirection		
Task Analysis and Chaining		
Cognitive Behavioral Interventions		
Joint Attention Intervention		

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EFFECTIVE ASD INTERVENTIONS	TABLE 3.3
<p>Modeling</p> <ul style="list-style-type: none"> Video Modeling Multi-component Package Naturalistic Interventions Parent Implemented Interventions Peer Mediated Interventions Picture Exchange Communication System™ Pivotal Response Training Schedules Self-management Social Communication Intervention Social Narratives Social Skills Intervention Speech Generating Devices Structured Work Systems Supported Employment Technology-based Treatment <ul style="list-style-type: none"> Computer-aided Instruction Visual Supports 	

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS

Medications

- Aripiprazole
- Methylphenidate**
- Risperidone

* A summary of the Comprehensive Treatment Models (CTM) evaluation is provided in Chapter Four for individuals interested in information about comprehensive intervention programs. Because the CTM review evaluated intervention programs across multiple categories without offering overall conclusions about program effectiveness, the CTM results are not included in the list of effective interventions or other tables in this chapter.

** StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

Medications are referred to by generic names in Table 3.3 and throughout the Guide. The intervention names used in this chapter are drawn directly from the systematic reviews; when reviews used different terms to refer to the same behavioral intervention, preference was given to the most inclusive terminology. Table 3.4 provides a cross-reference of the behavioral intervention names used in this chapter and how they relate to the behavioral intervention names used in each systematic review.

**CROSS-REFERENCE OF EFFECTIVE* BEHAVIORAL INTERVENTION NAMES
USED ACROSS REPORTS**

TABLE 3.4

INTERVENTION NAME	OTHER NAMES USED TO DESCRIBE INTERVENTION
COMPREHENSIVE INTERVENTIONS	
Comprehensive Behavioral Intervention Programs for Young Children	Comprehensive Behavioral Treatment for Young Children (NSP & CMS); Early Intensive Behavioral and Developmental Approaches (AHRQ). These programs may also be referred to as Applied Behavior Analysis (ABA), Early Intensive Behavioral Interventions (EIBI), or behavioral inclusive programs (NSP).
Structured Teaching	Structured Teaching (NSP & CMS) describes programs such as TEACCH (AHRQ) and overlaps with Structured Work Systems which are one component of Structured Teaching/ TEACCH
FOCUSED INTERVENTIONS	
Antecedent Package	Antecedent Package (NSP & CMS) groups a variety of antecedent-based interventions; NPDC uses three categories: Prompting, Time Delay, and Stimulus Control/ Environmental Modification (also referred to as Antecedent-based Interventions)
Prompting	Term used by NPDC and included in Behavioral Strategies category; Antecedent Package (NSP & CMS)
Stimulus Control/ Environmental Modification	Term used by NPDC interchangeably with Antecedent-based Interventions and included in overall category of Positive Behavioral Support Strategies; Antecedent Package (NSP & CMS)
Time Delay	Term used by NPDC and included in Behavioral Strategies category; Antecedent Package (NSP & CMS)
Behavioral Package	Behavioral Package (NSP & CMS) groups a variety of behaviorally based interventions; NPDC lists nine separate interventions that fit within this category.
Differential Reinforcement	Term used by NPDC and included in overall category of Positive Behavioral Support Strategies; Behavioral Package (NSP & CMS)
Discrete Trial Training	Term used by NPDC; Behavioral Package (NSP & CMS)
Extinction	Term used by NPDC and included in overall category of Positive Behavioral Support Strategies; Reductive Package (NSP & CMS)
Functional Behavioral Assessment	Term used by NPDC and included in overall category of Positive Behavioral Support Strategies; Behavioral Package (NSP & CMS)

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CROSS-REFERENCE OF EFFECTIVE* BEHAVIORAL INTERVENTION NAMES USED ACROSS REPORTS		TABLE 3.4
INTERVENTION NAME	OTHER NAMES USED TO DESCRIBE INTERVENTION	
Functional Communication Training	Term used by NPDC and included in overall category of Positive Behavioral Support Strategies; Behavioral Package (NSP & CMS)	
Reinforcement	Term used by NPDC and included in Behavioral Strategies category; Behavioral Package (NSP & CMS)	
Response Interruption/Redirection	Term used by NPDC and included in overall category of Positive Behavioral Support Strategies; Behavioral Package (NSP & CMS)	
Task Analysis and Chaining	Term used by NPDC and included in Behavioral Strategies category; Behavioral Package (NSP & CMS)	
Cognitive Behavioral Interventions	Cognitive Behavioral Intervention Package (NSP & CMS); Cognitive Behavioral Therapy (AHRQ)	
Computer-aided Instruction	Similar to Technology-based Treatment (NSP & CMS) and Computer-based Approaches (AHRQ)	
Joint Attention Intervention	Joint Attention Intervention (NSP & CMS); NPDC treated joint attention as an outcome rather than a type of intervention; interventions in this category overlap with multiple NPDC categories	
Modeling	Modeling (NSP & CMS) overlaps with Video Modeling (NPDC)	
Multi-component Package	This term is used only by NSP and CMS to describe interventions that do not clearly fit in another category	
Naturalistic Interventions	Term used by NPDC; NSP and CMS use the term Naturalistic Teaching Strategies	
Parent Implemented Interventions	Parent Training Approaches and Symbolic Play and Play-based Interventions (AHRQ)	
Peer Mediated Interventions	Term used by NPDC; NSP and CMS use Peer Training Package	
Picture Exchange Communication System	None; NPDC, NSP and CMS consistently use this term.	
Pivotal Response Training	Term used by NPDC; Pivotal Response Treatment (NSP & CMS); included in Parent Training Approaches (AHRQ)	
Schedules	Schedules (NSP & CMS) overlap with Structured Work Systems and Visual Supports (NPDC)	

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**CROSS-REFERENCE OF EFFECTIVE* BEHAVIORAL INTERVENTION NAMES
USED ACROSS REPORTS**

TABLE 3.4

INTERVENTION NAME	OTHER NAMES USED TO DESCRIBE INTERVENTION
Self-management	None; this term is used consistently by NPDC, NSP and CMS
Social Communication Intervention	Interventions included in this category by NSP and CMS are included in the AHRQ Parent Training Approaches category
Social Narratives	Social Narratives (NPDC) overlaps with Story-based Intervention Packages (NSP & CMS)
Social Skills Intervention	Social Skills Training Groups (NPDC) is similar to Social Skills Package (NSP & CMS) and Social Skills Training (AHRQ)
Speech Generating Devices	Speech Generating Devices (NPDC) also referred to as VOCA overlaps with Augmentative and Alternative Communication Devices (NSP & CMS)
Structured Work Systems	Structured Work Systems (NPDC) are one component of Structured Teaching (NSP & CMS) or TEACCH (AHRQ) and also overlap with Schedules (NSP & CMS)
Supported Employment	None
Technology-based Treatment	Technology-based Treatment (NSP & CMS) overlaps with Computer-Aided Instruction (NPDC) and Computer-based Approaches (AHRQ)
Video Modeling	Video Modeling (NPDC) overlaps with Modeling (NSP & CMS)
Visual Supports	Visual Supports (NPDC) overlaps with Schedules (NSP & CMS)

*Note: This document uses the term “effective” to describe interventions ranked at the top level of research support by one or more of the systematic reviews summarized in this Guide.

Table 3.5 provides information about how each effective intervention was ranked by the relevant systematic review. A checkmark indicates that the systematic review ranked the intervention as having a high level of evidence of effectiveness. Emerging or Insufficient Evidence indicates that the intervention was not ranked as having a high level of evidence of effectiveness by that review. Not reviewed indicates that the intervention was not considered in that particular review. There are many reasons why a specific intervention may not have been included; for example, it may mean that the focus of the review did not include that type of intervention or that no studies met the criteria required to be included in the review. Further details are available in the summaries of each review in Chapter Four.

EFFECTIVE ASD INTERVENTIONS BY RESEARCH REVIEWS

TABLE 3.5

BEHAVIORAL INTERVENTIONS**Comprehensive Behavioral Interventions**

	NPDC	CMS	NSP	AHRQ
Comprehensive Behavioral Intervention Programs for Young Children	Not Reviewed	✓	✓	✓
Structured Teaching	Not Reviewed	✓	Emerging	Insufficient Evidence

Focused Behavioral Interventions

	NPDC	CMS	NSP	AHRQ
Antecedent Package	Not reviewed as a package	✓	✓	Not Reviewed
Prompting	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Stimulus Control/Environmental Modification	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Time Delay	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Behavioral Package	Not reviewed as a package	✓	✓	Not Reviewed
Differential Reinforcement	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Discrete Trial Training	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Extinction	✓	Emerging (as part of Reductive Package)	Emerging (as part of Reductive Package)	Not Reviewed
Functional Behavioral Assessment	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Communication Training	✓			Not Reviewed
Reinforcement	✓			Not Reviewed
Response Interruption/Redirection	✓			Not Reviewed
Task Analysis and Chaining	✓			Not Reviewed
Cognitive Behavioral Interventions	Not Reviewed	✓	Emerging	Insufficient Evidence

(CONTINUED)

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EFFECTIVE ASD INTERVENTIONS BY RESEARCH REVIEWS

TABLE 3.5

	NPDC	CMS	NSP	AHRQ
Joint Attention Intervention	Not Reviewed	✓	✓	Insufficient Evidence
Modeling	See Video Modeling	Emerging	✓	Not Reviewed
Video Modeling	✓	✓	✓	Not Reviewed
Multi-component Package	Not Reviewed	✓	Emerging	Not Reviewed
Naturalistic Interventions	✓	✓	✓	Not Reviewed
Parent Implemented Interventions	✓	Emerging	Not reviewed	Insufficient Evidence
Peer Mediated Interventions	✓	✓	✓	Insufficient Evidence
Picture Exchange Communication System	✓	✓	Emerging	Insufficient Evidence
Pivotal Response Training	✓	Emerging	✓	Insufficient Evidence
Schedules	Not Reviewed	✓	✓	Not Reviewed
Self-management	✓	Emerging	✓	Not Reviewed
Social Communication Intervention	Not Reviewed	✓	Emerging	Insufficient Evidence
Social Narratives	✓	✓	✓	Not Reviewed
Social Skills Intervention	✓	✓	Emerging	Insufficient Evidence
Speech Generating Devices	✓	Emerging	Emerging	Not Reviewed
Structured Work Systems	✓	Not Reviewed	Not Reviewed	Not Reviewed
Supported Employment	Not Reviewed	✓	Not Reviewed	Not Reviewed
Technology-based Treatment	Not Reviewed	✓	Emerging	Not Reviewed
Computer-aided Instruction	✓	✓	Emerging	Insufficient Evidence
Visual Supports	✓	Not Reviewed	Not Reviewed	Not Reviewed

(CONTINUED)

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EFFECTIVE ASD INTERVENTIONS BY RESEARCH REVIEWS		TABLE 3.5
MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS		
Medications		
	StART	AHRQ
Aripiprazole	Not Reviewed	✓
Methylphenidate*	✓	Insufficient Evidence
Risperidone	✓	✓

*StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

Goal Areas Targeted by Effective ASD Interventions

Some of the reviews, such as NPDC, NSP, and CMS, provide detailed information about the goal areas for which research supports the effectiveness of an intervention; this information can be found in the review summaries in Chapter Four. For the purposes of this Guide, four broad goal areas were developed to summarize the more numerous and varied categories used across the reviews. Appendix C provides an explanation of how the categories used by the original reviews were synthesized into the four overall areas: social, communication, behavior, and academic.

Any attempt to categorize goals addressed by ASD interventions is complicated by the significant overlap of the target behaviors and skills. The four categories presented are not discrete and, in fact, are necessarily interdependent. However, general information about the types of goals for which an intervention has evidence of effectiveness provides a useful starting point for families and providers.

Social refers to goals involving social interaction skills such as joint attention, friendship skills, pretend play, social engagement, social problem-solving skills, and appropriate participation in group activities.

Communication refers to goals that involve verbally or nonverbally signaling information to a social partner, such as requesting, labeling, receptive and expressive language, conversation, greetings, speech, and pragmatics.

Behavior refers to goals that involve decreasing problem behaviors or increasing adaptive behaviors.

Academic refers to goals involving skills that are required for success with school activities.

Table 3.6 indicates which interventions have evidence of effectiveness in each general goal area. A checkmark indicates that at least one of the systematic reviews contains evidence that the intervention is effective in addressing that goal area. An empty box does not mean that the intervention provides no benefits in that area; rather, it indicates that the systematic reviews presented in this Guide did not provide specific evidence of effectiveness in that area. Appendix C has additional information regarding effective interventions by goal areas.

EFFECTIVE ASD INTERVENTIONS BY GOAL AREAS ADDRESSED

TABLE 3.6

COMPREHENSIVE BEHAVIORAL INTERVENTIONS

	SOCIAL	COMMUNICATION	BEHAVIOR	ACADEMIC
Comprehensive Behavioral Intervention Programs for Young Children	✓	✓	✓	✓
Structured Teaching	✓	✓	✓	✓

FOCUSED BEHAVIORAL INTERVENTIONS

Antecedent Package	✓	✓	✓	✓
Prompting				✓
Stimulus Control/Environmental Modification	✓		✓	✓
Time Delay	✓	✓		✓
Behavioral Package	✓	✓	✓	✓
Differential Reinforcement		✓	✓	
Discrete Trial Training		✓	✓	
Extinction		✓	✓	
Functional Behavioral Assessment		✓	✓	
Functional Communication Training		✓	✓	
Reinforcement	✓	✓	✓	✓
Response Interruption/Redirection		✓	✓	✓
Task Analysis and Chaining	✓	✓	✓	✓
Cognitive Behavioral Interventions	✓	✓	✓	✓
Joint Attention Intervention	✓	✓	✓	✓
Modeling	✓	✓	✓	✓
Video Modeling	✓	✓	✓	✓
Multi-component Package	✓	✓	✓	✓
Naturalistic Interventions	✓	✓	✓	✓
Parent Implemented Interventions	✓	✓	✓	
Peer Mediated Interventions	✓	✓	✓	
Picture Exchange Communication System	✓	✓	✓	
Pivotal Response Training	✓	✓	✓	
Schedules	✓	✓	✓	✓
Self-management	✓	✓	✓	✓
Social Communication Intervention	✓	✓		
Social Narratives	✓	✓	✓	
Social Skills Intervention	✓	✓		
Speech Generating Devices	✓	✓		
Structured Work Systems			✓	✓
Supported Employment	✓	✓	✓	✓
Technology-based Treatment	✓	✓	✓	✓
Computer-aided Instruction	✓	✓		✓
Visual Supports	✓	✓	✓	✓

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS

Medications

Aripiprazole			✓	
Methylphenidate*			✓	
Risperidone			✓	

*StART found that methylphenidate was effective for reducing hyperactivity in children with ASD; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

Ineffective ASD Interventions

Thus far, this chapter has focused on providing information about effective ASD interventions. Research evidence also has provided important information about interventions that have not been shown to be effective. Although interventions with insufficient evidence require more research to determine whether they are effective, an intervention is described as ineffective when there is sufficient evidence to conclude that the intervention did not result in the intended outcomes. Information about ineffective interventions may be limited by the fact that researchers often discontinue studies if preliminary data collection does not show positive results. In addition, if an intervention already was shown to be ineffective with the general population or another clinical population, researchers are less likely to study that intervention with individuals on the autism spectrum. Table 3.7 lists ineffective interventions, including the areas in which they failed to produce positive results. The systematic review from which the information was taken is noted in parentheses.

INEFFECTIVE ASD INTERVENTIONS

TABLE 3.7

- **Methylphenidate** was shown to be ineffective for the treatment of restricted, repetitive behaviors or irritability (StART).
- **Naltrexone** was shown to have no effect on impaired social interaction, impaired communication, or restricted, repetitive behaviors (StART).
- **Secretin** was shown to be ineffective with respect to general core symptoms as well as self-stimulatory behaviors, impaired communication, restrictive and repetitive behaviors, and gastrointestinal problems (StART, AHRQ).

Harmful ASD Interventions

When there is sufficient evidence to show that an intervention produces negative outcomes, it is described as harmful. Although the six systematic reviews included in this *Guide* did not identify harmful ASD interventions, this does not mean that all interventions used with individuals with ASDs are safe. When preliminary research findings suggest that an intervention is harmful, ethical guidelines require researchers to take steps to minimize harm and to discontinue a study if results suggest continuing or serious harm. Therefore, studies of potentially harmful interventions often are not completed and thus are not published in the research literature. In addition, if research shows that an intervention is harmful for the general population or another specific population (e.g., individuals with developmental disabilities), ethical researchers do not apply these harmful treatments to individuals on the autism spectrum just to show that they also are harmful to individuals with ASDs. It is important to be familiar with all available information about a potential intervention, including research or public health guidelines that are not specific to ASDs. Intervention selection always should include open discussion about any potential harmful effects of the intervention under discussion, which is a key aspect of informed consent.

Other ASD Interventions

This chapter focuses on effective ASD interventions and provides information about ineffective and harmful interventions. For many ASD interventions, more research is needed before conclusions can be drawn about whether the intervention is effective. The systematic reviews included in this *Guide* use a variety of terms to describe interventions for which more research is needed, including Level 2: Emerging and Level 3: Unestablished (CMS); Emerging or Unestablished (NSP); Insufficient Evidence (AHRQ); and Marginal Evidence (StART). When an intervention is identified as having limited evidence or lacking research support, it does not necessarily mean that the intervention produces no beneficial outcomes. For example, in the NSP classification system, all interventions described as emerging showed some beneficial outcomes, but lacked sufficient evidence to describe them as established.

Although effective interventions provide a starting point for intervention selection, information about other interventions may be needed to answer questions, provide a basis for comparison, or provide alternatives when effective interventions are not sufficient to address a specific concern for a particular individual. Information about other ASD interventions is provided in the summaries of the systematic reviews presented in Chapter Four. In addition, the Index of Intervention Names on page 222 can be used to locate information about a specific intervention of interest.

Need for Additional Research

Each of the six systematic reviews included in this *Guide* describes the limitations of the currently available research on ASD interventions and emphasizes the significant need for future research. Current knowledge about the effectiveness of ASD interventions is limited by the small number of studies or absence of research available regarding specific interventions, the lack of high-quality research methods, and the narrow focus of many studies. The need for additional research also emerged as a theme in the collaborative discussions of these data by Initiative members.

Accurate interpretation of currently available research findings requires an understanding of the limitations of the findings. For example, if an intervention is not listed as effective in Table 3.3, it does not mean that the intervention does not work or has not been associated with positive outcomes. Although a few interventions have been proven to be ineffective, for many interventions, currently available evidence is insufficient to determine whether the intervention results in the intended improvements for individuals with ASDs. Similarly, the age ranges and target goals listed for the effective interventions (see pages 76 to 114) indicate the extent of the research evidence identified by the systematic reviews. This does not mean that the effective interventions do not provide benefits in other areas or for individuals outside of the given age range, but rather that additional research is needed to document additional goal areas or ages for which the interventions may be effective.

Areas for future research include study of all types of ASD interventions with potential benefits, replication of promising results from small studies, and application of high-quality research methods such as those utilizing a comparison group. In addition, well-designed studies are needed to provide more specific information about which individuals with ASDs are most likely to benefit from a particular intervention. Component analysis also is needed to identify which specific elements of multi-component interventions are needed for effectiveness. Other areas in need of study include the generalizability and maintenance of positive outcomes, parent and family characteristics that contribute to intervention effectiveness, and comparisons of effective interventions in isolation and in combination. Of great importance is the need for research on ASD interventions for adults.

More research also is needed to improve understanding of the individual characteristics that may determine whether a given intervention is effective for that individual (i.e., what works for whom). Professional expertise can provide guidance about variables such as cognitive level and initial level of communication skills in intervention selection, but more specialized research is needed to aid in matching interventions to specific individual characteristics.

Looking Ahead Toward New Research

As families and professionals strive to keep pace with the latest findings on ASD interventions, attention is needed to the *quality* of research findings regarding specific interventions as well as to the extent to which results have been replicated. A list of questions that may aid readers in evaluating new research findings is presented in Chapter Two. Updates already are underway for both the National Standards Project and the National Professional Development Center findings. These updates and additional systematic reviews generated from nationally recognized collaborative efforts, such as the Autism Treatment Network, will continue to provide a source of high-quality data on the degree of research support for various ASD interventions.

As described repeatedly throughout this *Guide*, accessibility of research findings is limited by the variation in methodologies applied by the professionals involved in conducting systematic reviews. Individuals and families, as well as professionals involved in delivering intervention services, will benefit from increased coordination and collaboration among researchers. In addition, families and professionals can advance research by advocating for, supporting, and participating in research studies on ASD interventions.

Description of Effective ASD Interventions

The following series of tables provides more in-depth information about the effective ASD interventions presented in this chapter. Each table provides the following information based on the findings of the systematic reviews:

- a definition and general description of the effective intervention;
- information about which reviews ranked it at the highest level of research support;
- information, if available, about the age range of individuals for which it has been shown to be effective;
- information regarding the goal areas in which positive outcomes have been demonstrated; and
- resources for accessing additional information about the intervention.

Interventions are presented alphabetically by category consistent with the other tables in this chapter; the order does not reflect ranking, merit, or preference. The definitions provided are taken directly from the systematic reviews. Age ranges and goal areas for which the intervention has been shown to be effective also were taken directly from the reviews. Several of the resources listed in the tables are adapted with permission from *A Parent's Guide to Evidence-Based Practice and Autism*, produced by the National Autism Center.

**EFFECTIVE
INTERVENTION**
TABLE 1

**COMPREHENSIVE BEHAVIORAL INTERVENTION PROGRAMS FOR YOUNG CHILDREN
[CMS, NSP, AHRQ]**

Definition	This intervention is based on research from comprehensive treatment programs that involve a combination of applied behavior analytic procedures (e.g., discrete trial, incidental teaching, etc.) delivered to young children (generally under the age of 8). These treatments may be delivered in a variety of settings (e.g., home, self-contained classroom, inclusive classroom, community) with a low student-to-teacher ratio (e.g., 1:1). Studies falling into this category met the strict criteria of (a) targeting the defining symptoms of ASD, (b) having treatment manuals, (c) providing treatment with a high degree of intensity, and (d) measuring the overall effectiveness of the program. These treatments are often described as ABA (or Applied Behavior Analysis program), EIBI (or Early Intensive Behavioral Intervention program), or behavioral inclusive programs.
Further Description of Intervention	The intervention involves a commitment of 2 to 3 years of one-on-one direct instruction, mostly in the home, for 25 to 40 hours a week in basic skills training. Family members are actively engaged in the child's program. The goal is to reduce or replace autistic symptoms with typical behavior and prepare the child to enter school ready to learn. In learning sessions interrupted by brief breaks throughout the day, the child is taught how to make eye contact; to imitate modeled and spontaneous behaviors of others including speech; and to notice and understand important social, verbal, and non-verbal cues. The intervention team, including family members, spends hours planning and implementing a positive and supportive learning environment and developing strategies for generalizing learning to the real world.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Higher Cognitive Functions, Interpersonal, Motor, Personal Responsibility, Placement, Play CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior
Age Range Supported by Evidence	18 Months to 9 years
Resources	Lovaas, O. I. (2002). <i>Teaching individuals with developmental delays: Basic intervention techniques</i> . Austin, TX: Pro-Ed. Maurice, C., Green, G., & Luce, S. (Eds.). (1996). <i>Behavioral intervention for young children with autism: A manual for parents and professionals</i> . Austin, TX: Pro-Ed.

**EFFECTIVE
INTERVENTION
TABLE 2**

STRUCTURED TEACHING [CMS]	
Definition	Based on neuropsychological characteristics of individuals with ASDs, this intervention involves a combination of procedures that rely heavily on the physical organization of a setting, predictable schedules, and individualized use of teaching methods. These procedures assume that modifications in the environment, materials, and presentation of information can make thinking, learning, and understanding easier for people with ASDs if they are adapted to individual learning styles of autism and individual learning characteristics. All of the studies in this category met the strict criteria of (a) targeting the defining symptoms of ASD, (b) having treatment manuals, (c) providing treatment with a high degree of intensity, and (d) measuring the overall effectiveness of the program. These treatment programs may also be referred to as TEACCH.
Further Description of Intervention	A TEACCH classroom is more structured than the average special day class, i.e., the physical environment and all program activities are designed uniformly, with separate, defined spaces for each task, including spaces for individual work, shared group activities, and play/social activities. The program relies heavily on visual learning – a learning strength for many children with ASDs. Activities for students are driven by schedules made up of pictures and words into a sequence of activities that help each child move smoothly between activities throughout the day. The structure of the TEACCH program makes it easier for children with ASDs who typically find it difficult to make transitions between activities and places without schedules.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior
Age Range Supported by Evidence	Birth to 18 years
Resources	Mesibov, G., Shea, V., & Schopler, E. (2005). <i>The TEACCH approach to autism spectrum disorders</i> . New York, NY: Plenum.

**EFFECTIVE
INTERVENTION**
TABLE 3

ANTECEDENT PACKAGE [NSP, CMS, NPDC]	
Definition	These interventions involve the modification of situational events that typically precede the occurrence of a target behavior. These alterations are made to increase the likelihood of success or reduce the likelihood of problems occurring. Treatments in this category reflect research representing the fields of applied behavior analysis (ABA), behavioral psychology, and positive behavior supports (PBS).
Further Description of Intervention	Behaviors are more or less likely to occur when a child encounters certain changes in his/her immediate surroundings. Antecedent package consists of several ways to use the influence of environmental events (including people, places, and things) to increase or decrease the likelihood that a specific behavior will occur. The likelihood that a child's behavior can be increased or decreased by altering the immediate environment is an efficient way to improve behavior. A well-timed spoken word, the presence of a particular person, showing the reinforcer before the response you want to occur, and presenting a visual sign are common examples of antecedent events that can be used to control behavior.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Learning Readiness, Personal Responsibility, Play, and Self-Regulation. CMS: Communication, Social Development, Sensory and Motor Development, Adaptive Behavior, and Problem Behavior. NPDC: Academic, Communication, Play, and Social.
Age Range Supported by Evidence	3 to 18 years
Resources	Luiselli, J. K. (2006). <i>Antecedent assessment & intervention: Supporting children & adults with developmental disabilities in community settings</i> . Baltimore, MD: Paul H. Brookes.

**EFFECTIVE
INTERVENTION
TABLE 4**

PROMPTING [NPDC, CMS, NSP]	
Definition	Prompting is a behaviorally based antecedent teaching strategy. A prompt is a verbal, physical, or gestural cue presented to a child to stimulate a child's response. Modeling a specific behavior or arranging objects in a particular order can also be a form of prompting. Even a pause while waiting for a child to respond can be a prompt. Types of prompts are categorized from least to most intrusive. Teaching begins using the least intrusive prompt. Prompts need to be faded as quickly as possible after the child learns to respond in order to avoid prompt dependence.
Further Description of Intervention	When instruction is given to the child with an ASD, e.g. "pick up toys," a correct and quick response is expected. The instruction is a request to respond to a specific stimulus (in this case a verbal instruction) and a specific response is expected to occur. If the child hesitates or doesn't seem to understand the purpose of the instruction, the instruction is supplemented with a prompt to increase the chance that the child will respond and be reinforced for responding. Prompts occur in different forms (e.g., verbal, physical, gestures, and modeling) and are graduated from least intrusive to most intrusive. The goal is to teach the child to respond consistently to the instruction and not to depend on a prompt.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Play CMS: Communication, Social Development, Problem Behavior NPDC: Academic Instruction
Age Range Supported by Evidence	2 to 22 years
Resources	Odom, S., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders. <i>Preventing School Failure</i> , 54(4), 275–282.

**EFFECTIVE
INTERVENTION**
TABLE 5

STIMULUS CONTROL/ENVIRONMENTAL MODIFICATION [NPDC]	
Definition	Stimulus control/environmental modification interventions are designed to alter the context in which a challenging behavior is occurring. Stimulus control refers to the influence of an environmental stimulus on the occurrence of a response because reinforcement was presented only when the stimulus was present. The ring of the telephone has stimulus control of answering the phone because reinforcement typically follows answering the phone. A stimulus that controls a behavior is also an antecedent, i.e., the stimulus is present before the response occurs. Identifying and changing the antecedent may prevent or reduce interfering and challenging behaviors in the classroom or at home.
Further Description of Intervention	Stimulus control and corresponding environmental modifications can be used by parents or teachers to reduce repetitive, stereotypical, self-stimulatory, and self-injurious behaviors in learners with ASDs. Environmental modifications are used to change the stimulus conditions in the setting where the student with an ASD engages in inappropriate behavior. To more quickly achieve a reduction in negative behavior, other evidence-based interventions, including non-contingent reinforcement, functional communication training, and behavioral momentum (high probability request sequence), are used. Extinction and/or differential reinforcement are sometimes combined with stimulus control/environmental modification interventions.
Goal Areas Demonstrating Positive Outcomes	NPDC: Academic, Behavior, Play
Age Range Supported by Evidence	3 to 16 years
Resources	Luiselli, J. K. (2006). <i>Antecedent assessment & intervention: Supporting children & adults with developmental disabilities in community settings</i> . Baltimore, MD: Paul H. Brookes. Conroy, M., Asmus, J., Sellers, J., & Ladwig, C. (2005). The use of an antecedent-based intervention to decrease stereotypic behavior in a general education classroom: A case study. <i>Focus on Autism and Other Developmental Disabilities</i> , 20(4), 223-230.

**EFFECTIVE
INTERVENTION
TABLE 6**

TIME DELAY [NPDC, CMS, NSP]	
Definition	Time delay is a practice that focuses on fading the use of prompts during instructional activities. This practice is always used in conjunction with prompting procedures such as least-to-most prompting, simultaneous prompting, and graduated guidance. With this procedure, a brief delay is provided between the initial instruction and any additional instructions or prompts.
Further Description of Intervention	When any form of prompting is used during instruction, it is appropriate to consider time delay as a way of reducing (fading) the use of prompts, which in turn reduces the likelihood of encouraging prompt dependence in the child. Prompts used during instruction are gradually reduced by inserting a delay (a few seconds) between the instruction and the moment of offering a prompt; i.e., the length of time between the instruction and the prompt is gradually increased which gives the child a chance to respond before the prompt occurs.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Self-Regulation, Play CMS: Social Skills NPDC: Academic, Communication, Play, Social
Age Range Supported by Evidence	6 to 11 years
Resources	Cooper, J., Heron, T. E., & Heward, W. (2007). <i>Applied behavior analysis</i> . Upper Saddle River, NJ: Pearson Education, Inc. Liber, D. B., Frea, W. D., & Symon, J. B. (2008). Using time-delay to improve social play skills with peers for children with autism. <i>Journal of Autism and Developmental Disorder</i> , 38(2), 312-323.

**EFFECTIVE
INTERVENTION**
TABLE 7

BEHAVIORAL PACKAGE [NPDC, CMS, NSP]	
Definition	These interventions are designed to reduce problem behavior and teach functional alternative behaviors or skills through the application of basic principles of behavior change. Treatments falling into this category reflect research representing the fields of applied behavior analysis, behavioral psychology, and positive behavior supports. Treatments included in the behavioral package category are based on behavioral principles. These treatments begin with an evaluation of what happens in the environment before and after the behavior being targeted. Then, using the data they collect, behavior specialists modify the environment accordingly. At a minimum, behavioral package strategies alter the consequences that are provided for appropriate and/or inappropriate behavior.
Further Description of Intervention	The consequence that follows a child's response, i.e., the event that immediately follows a response initiated by the child, whether it is positive or negative, determines the strength of the child's response. Behavioral package consists of numerous intervention techniques that use consequences to strengthen learning in children with ASDs. Behavioral package interventions are used to reduce unwanted behaviors and to teach acceptable alternative (more functional) skills. To determine which intervention(s) is most appropriate, the child is observed under different environmental conditions to determine which consequence that follows the child's behavior is most likely maintaining the behavior. When one or more consequences are known to be maintaining a child's behavior, specific intervention techniques can be chosen to effectively teach new or replacement skills. All of the interventions included in behavioral package are known to be effective in reducing or replacing behaviors.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Motor, Personal Responsibility, Play, Self-Regulation CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior NPDC: Academic, Behavior, Communication, Play, Social, Transitions
Age Range Supported by Evidence	Birth to 21 years
Resources	Fitzer, A., & Sturmey, P. (Eds.). (2009). <i>Language and autism: Applied behavior analysis, evidence, and practice</i> . Austin, TX: PRO-ED. Fouse, B., & Wheeler, M. (1997). <i>A treasure chest of behavioral strategies for individuals with autism</i> . Arlington, TX: Future Horizons.

**EFFECTIVE
INTERVENTION
TABLE 8**

DIFFERENTIAL REINFORCEMENT [NPDC, CMS, NSP]	
Definition	Differential reinforcement procedures are behaviorally based strategies that focus reinforcement on alternative, incompatible, other, or lower rates of the interfering behavior in order to replace it with more appropriate behavior. Differential reinforcement means reinforcing one response class and withholding reinforcement for another response class. Differential reinforcement can be used to reduce problem behaviors by providing reinforcement contingent on the occurrence of a behavior other than the problem behavior or reinforcing the problem behavior at a reduced rate of reinforcement. Differential reinforcement can be used to strengthen incompatible behavior or alternative behavior.
Further Description of Intervention	When a child is engaging in multiple behaviors, some good and some bad, differential reinforcement is used to selectively increase one or more desirable behaviors over a period of time. If a child is motivated to respond in order to collect a reinforcer, presentation of the reinforcer provides the child with information that the specific response that earned the reinforcer was the correct response. The likelihood that the child will engage in that same response is increased. With one type of differential reinforcement, undesirable behaviors are ignored while behaviors that approximate the desired behavior are selectively reinforced.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Motor, Personal Responsibility, Play, Self-Regulation CMS: Self-management NPDC: Behavior, Communication
Age Range Supported by Evidence	4 to 12 years
Resources	Cooper, J., Heron, T. E., & Heward, W. (2007). <i>Applied behavior analysis</i> . Upper Saddle River, NJ: Pearson Education, Inc.

**EFFECTIVE
INTERVENTION**
TABLE 9

DISCRETE TRIAL TRAINING [NPDC, CMS, NSP]	
Definition	Discrete trial training (DTT) is a one-to-one instructional approach used to teach skills in a planned, controlled, and systematic manner. DTT is used when a learner needs to learn a skill best taught in small repeated steps. Each trial or teaching opportunity has a definite beginning and end, thus the descriptor discrete trial.
Further Description of Intervention	In discrete trial training, each skill that the child needs to learn is broken down into small steps and taught one step at a time. Because children with ASDs may not be motivated to learn in typical ways, may not interact with others effectively, or may not be attentive to cues provided by the teacher, the information to be learned is provided in small discrete steps. With this type of teaching, each child's program can be individualized to that child's unique requirements for learning. Each trial is completed within a few seconds and can be quickly repeated to further strengthen the child's learning. Each discrete trial is repeated in the same way: the teacher's instruction, followed by a prompt if needed, then the child's response, and finally the consequence which is determined by the quality of the child's response.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Higher Cognitive Functions, Interpersonal, Motor, Personal Responsibility, Play, Self-Regulation NPDC: Behavior, Communication
Age Range Supported by Evidence	2 to 9 years
Resources	Lovaas, O. I. (2002). <i>Teaching individuals with developmental delays: Basic intervention techniques</i> . Austin, TX: Pro-Ed. Maurice, C., Green, G., & Luce, S. (Eds.). (1996). <i>Behavioral intervention for young children with autism: A manual for parents and professionals</i> . Austin, TX: Pro-Ed.

**EFFECTIVE
INTERVENTION
TABLE 10**

EXTINCTION [NPDC]	
Definition	Extinction is a behaviorally based strategy that withdraws or terminates the reinforcer of an interfering behavior to reduce or eliminate the behavior. Extinction is a behavioral technique used to reduce or eliminate the occurrence of undesired behavior. Extinction refers to withholding or preventing a reinforcer that has previously followed a behavior, which causes the probability of the behavior to decrease. An example of extinction occurs when a teacher ignores a student's whining after whining was previously followed by the teacher's attention to the student.
Further Description of Intervention	If it is determined through observation that one or more reinforcers are maintaining a child's behavior, then extinction is appropriate as a reduction procedure. Ensuring that reinforcers are effectively eliminated requires careful observation and preparation including training. Extinction as a reduction procedure is known to be more effective when combined with other techniques such as differential reinforcement and instructions.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Motor, Personal Responsibility, Play, Self-Regulation CMS: Communication, Social Development, Adaptive Behavior, Problem Behavior NPDC: Behavior, Communication
Age Range Supported by Evidence	Birth to 21 years
Resources	Cooper, J., Heron, T. E., & Heward, W. (2007). <i>Applied behavior analysis</i> . Upper Saddle River, NJ: Pearson Education, Inc.

**EFFECTIVE
INTERVENTION**
TABLE 11

FUNCTIONAL BEHAVIORAL ASSESSMENT [NPDC, CMS, NSP]	
Definition	Functional behavioral assessment (FBA) is a systematic approach in which data are collected to determine the underlying function or purpose of problem behavior. FBA is the process of gathering and analyzing information about a student's behavior and accompanying circumstances to determine the purpose or intent of the actions. FBA consists of describing the interfering or problem behavior, identifying antecedent or consequent events that control the behavior, developing a hypothesis about the cause of the behavior, and testing the hypothesis. Data collection is an important part of the FBA process. Often, teachers/practitioners use functional communication training, differential reinforcement, response interruption/redirection, extinction, and stimulus control/environmental modification to address these problem behaviors in learners with ASDs.
Further Description of Intervention	FBA determines the appropriateness of the student's present setting and helps identify positive interventions to reduce or replace unwanted behaviors. FBA targets skills in the domains of behavior and communication, usually with a focus on decreasing inappropriate behavior and teaching or increasing appropriate communicative alternatives. Replacement skills include more appropriate forms of communication such as signing, pointing, talking, and the use of alternative and augmentative communication (AAC) devices. The assumptions underlying the use of functional behavioral assessment are that behaviors do not occur in a vacuum and that negative or inappropriate behaviors can be a form of communication, including an attempt to escape, an attempt to gain something, or a form of sensory stimulation.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Motor, Personal Responsibility, Placement, Play, Self-Regulation CMS: Communication, Social Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior NPDC: Behavior, Communication
Age Range Supported by Evidence	Birth to 21 years
Resources	Glasberg, B. (2005). <i>Functional behavior assessment for people with autism</i> . Bethesda, MD: Woodbine House O'Neil, R. E., Horner, R. H., Albin, R. W., Sprague, J. R., Storey, K., & Newton, J. S. (1997). <i>Functional assessment and program development for problem behavior: A practical handbook</i> (2nd ed.). Pacific Grove, CA: Brooks/Cole.

**EFFECTIVE
INTERVENTION
TABLE 12**

FUNCTIONAL COMMUNICATION TRAINING [NPDC, CMS, NSP]	
Definition	Functional communication training (FCT) is a systematic practice of replacing inappropriate or ineffective behaviors with more appropriate or effective behavior that serves the same function. FCT is used to create or strengthen alternative (more acceptable) behaviors in the presence of negative or unacceptable behavior. Teaching a more functional alternative communication skill allows the child to effectively earn the same reinforcer that was maintaining the problem behavior.
Further Description of Intervention	FCT requires a functional behavioral assessment to identify the reinforcers that maintain the problem behavior. After this is accomplished, those same reinforcers can be used to develop an alternative behavior that replaces the problem behavior. FCT includes teaching vocalizations and sign language, and using assistive devices, communication boards, picture cards, and other communication methods.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Personal Responsibility, Play, Self-Regulation CMS: Communication, Problem Behavior NPDC: Behavior, Communication
Age Range Supported by Evidence	Birth to 21 years
Resources	<p>Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). <i>Applied behavior analysis</i> (2nd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.</p> <p>Mancil, G. R., Conroy, M. A., Nakao, T., & Alter, P. J. (2006). Functional communication training in the natural environment: A pilot investigation with a young child with autism spectrum disorder. <i>Education and Treatment of Children</i>, 29(4), 615-633.</p>

**EFFECTIVE
INTERVENTION**
TABLE 13

REINFORCEMENT [NPDC, CMS, NSP]	
Definition	Reinforcement is a behaviorally based consequence teaching strategy. Positive reinforcement occurs when a behavior is followed immediately by the presentation of a stimulus that causes the frequency of the behavior to increase. Negative reinforcement occurs when a behavior is followed by the termination or withdrawal of a stimulus that causes the frequency of the behavior to increase in the future.
Further Description of Intervention	A stimulus is a reinforcer only if it increases the frequency of future behavior. There are different types of stimuli, including edible foods, sensory impressions, tangible objects, activity-related events, and social stimulation that can serve as reinforcers. For an individual child, selection and use of a specific reinforcer must be validated as reinforcing for that child.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Higher Cognitive Functions, Interpersonal, Motor, Personal Responsibility, Placement, Play, Self-Regulation CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior NPDC: Academic, Behavior, Communication, Play, Social, Transitions
Age Range Supported by Evidence	Birth to 21 years
Resources	Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). <i>Applied behavior analysis</i> (2nd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

**EFFECTIVE
INTERVENTION
TABLE 14**

RESPONSE INTERRUPTION/REDIRECTION [NPDC, CMS, NSP]	
Definition	The practice of response interruption/redirection (RIR) requires blocking the child from engaging in the targeted behavior. When the behavior occurs, the child is immediately redirected (prompted) to engage in a more appropriate behavior. This intervention is appropriate in cases where reinforcement is assumed to be automatic. In other words, the child's behavior is reinforcing in itself and is not dependent on external reinforcers. Blocking the behavior therefore prevents the reinforcing event. RIR is particularly useful with persistent interfering behaviors that occur in the absence of other people, in a number of different settings, and during a variety of tasks.
Further Description of Intervention	It is thought that repetitive motor movements that are nonfunctional for children with ASD can be automatically reinforcing. A functional analysis can be used to determine if automatic reinforcement is a factor. Such behaviors might include hand flapping, vocal repetitions, mouthing objects, pica, and self-injurious behaviors. RIR requires more supporting resources to implement. These behaviors often are not maintained by attention or escape. Instead, they are more likely maintained by sensory reinforcement and are often resistant to intervention attempts. RIR is particularly effective with sensory-maintained behaviors because teachers/practitioners interrupt learners from engaging in interfering behaviors and redirect them to more appropriate, alternative behaviors.
Goal Areas Demonstrating Positive Outcomes	NPDC: Academic, Behavior, Communication
Age Range Supported by Evidence	3 to 21 years
Resources	Ahearn, W. H., Clark, K. M., & MacDonald, R. P. F. (2007). Assessing and treating vocal stereotypy in children with autism. <i>Journal of Applied Behavior Analysis</i> , 40, 263-275.

**EFFECTIVE
INTERVENTION**
TABLE 15

TASK ANALYSIS AND CHAINING [NPDC, CMS, NSP]	
Definition	Task analysis and chaining is a behaviorally based antecedent teaching strategy that breaks down steps and links them for prompting. Task analysis is the process of identifying the individual steps of a specific behavioral skill. The purpose of task analysis is to make teaching the skill more manageable and enable a child to begin learning the individual steps at the child's level of readiness. Typically other evidence-based practices are used along with task analysis to enhance the child's success in acquiring skill.
Further Description of Intervention	The individual sequence of steps (movements) in completing a specific skill, primarily in teaching adaptive skills, is identified by analyzing the task to be taught and then reinforcing the successful completion of the next step in this sequence. As the child completes an individual step, the next step is reinforced and becomes part of the chain of steps that defines the skill being taught. After the individual sequences of movements that define the skill are identified, observation of the child's ability to engage in the task will indicate where in the sequence to begin teaching.
Goal Areas Demonstrating Positive Outcomes	NSP: Academic, Communication, Interpersonal, Motor, Personal Responsibility, Play, Self- Regulation NPDC: Academic, Communication, Play, Social, Transitions
Age Range Supported by Evidence	3 to 21 years
Resources	Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). <i>Applied behavior analysis</i> (2nd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

**EFFECTIVE
INTERVENTION
TABLE 16**

COGNITIVE BEHAVIORAL INTERVENTIONS [CMS]	
Definition	Cognitive behavioral interventions (CBIs) are designed to change negative or unrealistic thought patterns and behaviors with the aim of positively influencing emotions and life functioning.
Further Description of Intervention	CBIs are comprised of multiple interventions that are uniquely crafted for each individual and his/her needs. Cognitive behavioral techniques are known to work best with individuals who are verbal and have higher intelligence. The intervention process focuses on informing individuals about their emotional issues, assisting them in recognizing bodily responses, and organizing alternative responses to negative thoughts and feelings. The intervention process involves teaching problem solving typically in a group format. Modeling prosocial behavior, offering opportunities for role-playing, and rehearsing positive responses to typical situations with peers is part of the treatment. Obtaining solid measures of generalization of new skills to the real world following CBI has been problematic.
Goal Areas Demonstrating Positive Outcomes	NSP: Interpersonal CMS: Communication, Social Development, Cognitive Development, Problem Behavior
Age Range Supported by Evidence	6 to 18 years
Resources	Wood, J. J., Drahota, A., Sze, K., Har K., Chiu, A., & Langer, D. A. Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: A randomized, controlled trial. <i>Journal of Child Psychology and Psychiatry</i> , 50(3), 224-234. White, A. H. (2004). <i>Cognitive behavioural therapy in children with autistic spectrum disorder</i> . London, UK: Bazian Ltd.

**EFFECTIVE
INTERVENTION**
TABLE 17

JOINT ATTENTION INTERVENTION [CMS, NSP]	
Definition	Joint attention interventions teach a child to respond to the nonverbal social bids of others or to initiate joint attention interactions. These interventions involve building foundational skills for regulating the behaviors of others. Examples include pointing to objects, showing items/activities to another person, and following eye gaze.
Further Description of Intervention	Creating opportunities for the child with an ASD to learn to engage another child's attention is a critical skill for developing relationships, acquiring language, and connecting with and learning about the world. The ability to initiate shared enjoyment of an object, person, or event depends on a child's ability to initiate joint attention skills. Responding to a peer's request to engage in joint attention as well as initiating joint attention requests can be targeted for intervention. Teaching joint attention skills can begin as early as 9 months. Early and greater acquisition of joint attention skills predicts better long range outcomes in treatment for children with ASDs.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal CMS: Communication, Social Development
Age Range Supported by Evidence	Birth to 5 years
Resources	Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). Infants with autism: An investigation of empathy, pretend play, joint attention and imitation. <i>Developmental Psychology, 33</i> , 781-789.

**EFFECTIVE
INTERVENTION
TABLE 18**

MODELING [NPDC, NSP]	
Definition	Modeling interventions rely on an adult or peer providing a demonstration of the target behavior that should result in an imitation of the target behavior by the individual with an ASD. Modeling can include simple and complex behaviors. This intervention is often combined with other strategies such as prompting and reinforcement. Examples include live modeling and video modeling.
Further Description of Intervention	Modeling is a simple and inexpensive way of teaching a large number of skills to children with ASDs. For the child capable of attending, watching an adult or peer engage in the target behavior is a prompt for the child to imitate the target behavior and be immediately reinforced. Modeling is more effective with children who have already learned some of the steps in the specific skill being modeled.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Higher Cognitive Functions, Interpersonal, Personal Responsibility, Play CMS: Communication, Social Development, Cognitive Development NPDC: Behavior, Communication, Play, Social
Age Range Supported by Evidence	3 to 18 years
Resources	Kroeger, K. A., Schultz, J. R., & Newsom, C. (2007). A comparison of two group-delivered social skills programs for young children with autism. <i>Journal of Autism and Developmental Disorders</i> , 37(5), 808-817. Buggey, T. (2009). <i>Seeing is believing: Video self-modeling for people with autism and other developmental disabilities</i> . Bethesda, MD: Woodbine House.

**EFFECTIVE
INTERVENTION
TABLE 19**

VIDEO MODELING [NPDC, CMS, NSP]	
Definition	Video modeling utilizes assistive technology as the core component of instruction and allows for pre-rehearsal of the target behavior or skill via observation. It is a mode of teaching that uses video recording and display equipment to provide a visual model of the targeted behavior or skill. Types of video modeling include basic video modeling, video self-modeling, point-of-view video modeling, and video prompting. Basic video modeling involves recording someone besides the learner engaging in the target behavior or skill (i.e., models). The video is then viewed by the learner at a later time. Video self-modeling is used to record the learner displaying the target skill or behavior and is reviewed later. Point-of-view video modeling is when the target behavior or skill is recorded from the perspective of the learner. Video prompting involves breaking the behavior skill into steps and recording each step with incorporated pauses during which the learner may attempt the step before viewing subsequent steps. Video prompting may be done with either the learner or someone else acting as a model.
Further Description of Intervention	Use of video technology is effective for visual learners. Almost any social, adaptive, or play skill can be taught using video modeling. Videotaped sequences of the targeted behavior can include verbal and motor responses and serve as a “rehearsal” before the skill is attempted. The child with an ASD can participate in the videotape of the modeled behavior which inherently makes the experience more interesting.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Higher Cognitive Functions, Interpersonal, Personal Responsibility, Play CMS: Communication, Social Development, Cognitive Development NPDC: Behavior, Communication, Play, Social
Age Range Supported by Evidence	3 to 18 years
Resources	LaCava, P. (2008). <i>Video modeling: An online training module</i> . (Kansas City: University of Kansas, Special Education Department). In Ohio Center for Autism and Low Incidence (OCALI), Autism Internet Modules, www.autisminternetmodules.org . Columbus, OH: OCALI. Bellini, S., Akullian, J., & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using video self-modeling. <i>School Psychology Review</i> , 36, 80-90.

**EFFECTIVE
INTERVENTION
TABLE 20**

MULTI-COMPONENT PACKAGE [CMS]	
Definition	These interventions involve a combination of multiple treatment procedures that are derived from different fields of interest or different theoretical orientations.
Further Description of Intervention	Depending on the goals of the intervention program, in some instances several differently oriented but mutually beneficial interventions are combined to achieve the optimal outcome. Special education in-home teaching techniques could be combined with ABA interventions to produce an optimal outcome. Different disciplines, e.g., speech and language or assistive technology, can be combined with ABA approaches to achieve an outcome. Multi-component programs are likely to be appropriate for social skills training in which separate interventions (e.g., computer games, small group live modeling, curriculum driven training for parents to promote generalization, and teacher generated supports) are combined.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Adaptive Behavior, Problem Behavior
Age Range Supported by Evidence	Birth to 16 years
Resources	Rogers, S., Hayden, D., Hepburn, S., Charlifue-Smith, R., Hall, T., & Hayes, A. (2006). Teaching young nonverbal children with autism useful speech: A pilot study of the Denver Model and PROMPT interventions. <i>Journal of Autism and Developmental Disorders</i> , 36, 1007-1024.

**EFFECTIVE
INTERVENTION**
TABLE 21

NATURALISTIC INTERVENTIONS [NPDC, CMS, NSP]	
Definition	These interventions involve using primarily child-directed interactions to teach functional skills in the natural environment. These interventions often involve providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts. Examples of this type of approach include but are not limited to focused stimulation, incidental teaching, milieu teaching, embedded teaching, and responsive education and prelinguistic milieu teaching.
Further Description of Intervention	In naturalistic teaching, learning sessions are more relaxed (in comparison to traditional discrete trial training). Child-adult interactions depend on the child initiating and expressing an interest. The teaching location typically moves around different settings within the home or classroom, i.e., is incorporated into the child's daily routine. Reinforcement occurs naturally and is integral to the particular skill being taught (e.g., if the child says or attempts to say "ball," he/she is given a ball, the naturally occurring reinforcer).
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Learning Readiness, Play CMS: Communication, Social Development NPDC: Communication, Social
Age Range Supported by Evidence	Birth to 9 years
Resources	Charlop-Christy, M. H. (2008). <i>How to do incidental teaching</i> . Austin, TX: PRO-ED.

**EFFECTIVE
INTERVENTION
TABLE 22**

PARENT IMPLEMENTED INTERVENTIONS [NPDC]	
Definition	These strategies recognize and use parents as the most effective teachers of their children. Parent-implemented Intervention entails parents directly using individualized intervention practices with their child to increase positive learning opportunities and acquisition of important skills. Parents learn to implement such practices in their home and/or community through a structured parent training program.
Further Description of Intervention	Parents receiving 12 to 18 hours of training in basic teaching techniques can be very effective in promoting their child's development. Parent training can occur in group formats with six to eight families participating or individually in one-to-one training as an adjunct to the child's treatment program. Some school districts offer parent training sessions that include basic ABA principles, procedures for teaching self-help, self-regulation, and limited communication skills.
Goal Areas Demonstrating Positive Outcomes	NPDC: Behavior, Communication, Social, Transitions
Age Range Supported by Evidence	3 to 12 years
Resources	Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. <i>Journal of Autism and Developmental Disorders</i> , 28, 25-32. McConachie, H., Randle, V., Hammal, D., & Le Couteur, A. (2005). A controlled trial of a training course for parents of children with suspected autism spectrum disorder. <i>The Journal of Pediatrics</i> , 147, 335-340.

**EFFECTIVE
INTERVENTION**
TABLE 23

PEER MEDIATED INTERVENTIONS [NPDC, CMS, NSP]	
Definition	Peer mediated interventions are designed to increase social engagement by teaching peers to initiate and maintain interactions. These interventions involve teaching children without disabilities strategies for facilitating play and social interactions with children on the autism spectrum. Peers may include classmates or siblings. These interventions may include components of other treatment packages (e.g., self-management for peers, prompting, reinforcement, etc.). Common names for intervention strategies include peer networks, circle of friends, buddy skills package, Integrated Play Groups™, peer initiation training, and peer mediated social interactions.
Further Description of Intervention	Children who show a personal interest in children with ASDs are candidates for peer mediated interventions. These interventions can be implemented with pairs or small groups of learners. With young children, i.e., 3 to 8 years of age, practitioners can use peer-initiation training to help children with ASDs acquire communication and social skills. Social networking strategies are more appropriate for older learners i.e., 9 to 18 years of age. Peer mediated training has been shown to have positive effects on academic, interpersonal, and personal-social development, and may be the largest and most empirically supported type of social intervention for learners with ASDs.
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Play CMS: Communication, Social Development NPDC: Behavior, Communication, Social, Transition
Age Range Supported by Evidence	3 to 14 years
Resources	Cater, E. W., Cushing, L. S., & Kennedy, C. H. (2008). <i>Peer support strategies for improving all students' social lives and learning</i> . Baltimore, MD: Paul H. Brookes. Reid, D. H., & Parsons, M. B. (2002). <i>Facilitating play dates for children with autism and typically developing peers in natural settings: A training manual</i> . Morganton, NC: Habilitative Management Consultants.

**EFFECTIVE
INTERVENTION
TABLE 24**

PICTURE EXCHANGE COMMUNICATION SYSTEM™ [NPDC, CMS]	
Definition	The Picture Exchange Communication System™ (PECS™) was created by Andy Bondy, PhD, and Lori Frost, MS-CCC-SLP. PECS uses the physical handing over of pictures or symbols to initiate communicative functions (see www.pecs.com). This intervention involves the application of a specific augmentative and alternative communication system based on behavioral principles that are designed to teach functional communication to children with limited verbal and/or communication skills.
Further Description of Intervention	PECS is designed to teach functional communication to children 3 to 12 years old. Because communication is initiated by the child in a natural environment toward a familiar person, the child with an ASD learns to communicate socially. Using PECS, learners are taught to give a small picture of the desired item to a communicative partner in exchange for the item. PECS is appropriate for children who speak ineffectively, have significant articulation problems, or are poorly motivated to speak. There are six progressive training phases of PECS instruction: (1) teaching the child to request by initiating the exchange, (2) increasing the distance between the child and the communication partner, (3) discriminating between multiple images, (4) learning the “I want” image in order to expand sentence structure, (5) learning to correctly recognize, “What do you want?” and (6) expanding responses to “What do you ...?” questions.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development NPDC: Behavior, Communication, Social
Age Range Supported by Evidence	3 to 12 years
Resources	Pyramid Educational Consultants is the group authorized to provide PECS training. For more information about PECS, see www.pecs.com . Bondy, A.S., & L. Frost. (2001). The Picture Exchange Communication System. <i>Behavior Modification</i> , 25(5), 725-744. Chaabane, D., Alber-Morgan, S., & DeBar, R. (2009). The effects of parent-implemented PECS training on improvisation of mands by children with autism. <i>Journal of Applied Behavior Analysis</i> , 42, 671-677. Charlop-Christy, M.H., Carpenter, M., Le, L., LeBlanc, L., & Kelley, K. (2002). Using the Picture Exchange Communication System (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behaviors. <i>Journal of Applied Behavior Analysis</i> , 35, 213-231.

**EFFECTIVE
INTERVENTION**
TABLE 25

PIVOTAL RESPONSE TRAINING [NPDC, NSP]	
Definition	Pivotal response training (PRT) focuses on targeting “pivotal” behavioral areas, such as motivation to engage in social communication, self-initiation, self-management, and responsiveness to multiple cues, with the development of these areas having the goal of very widespread and fluently integrated collateral improvements. Key aspects of PRT intervention delivery also focus on parent involvement in the intervention delivery and on intervention in the natural environment such as homes and schools with the goal of producing naturalized behavioral improvements.
Further Description of Intervention	PRT is a naturalistic intervention approach based on the principles of applied behavior analysis (ABA). Teaching is designed to promote the child’s ability to interpret and respond to a broad range of environments. Strengthening the child’s personal motivation and initiative by developing “pivotal” behaviors are essential values in this approach. PRT is child directed and relies on naturally occurring teaching opportunities and naturally occurring consequences. Motivation and initiation are increased by allowing choices, turn-taking, reinforcing attempts to respond, and interspersing periodic reinforcement for tasks already mastered. “Pivotal behaviors are those behaviors that are central to wide areas of a child’s functioning, and when promoted, they are believed to produce improvement in many non-targeted behaviors.” (See the Autism Intervention Research Program, University of San Diego at http://autismlab.ucsd.edu/about/pivotal-response-training.shtml .)
Goal Areas Demonstrating Positive Outcomes	NSP: Communication, Interpersonal, Play NPDC: Behavior, Communication, Play, Social
Age Range Supported by Evidence	3 to 9 years
Resources	Koegel, R. L., Schreffirnan, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L. K. (1998). <i>How to teach pivotal behaviors to children with autism: A training manual</i> . Santa Barbara, CA: University of California. Koegel, R. L., & Koegel, L. K. (2006). <i>Pivotal response treatments for autism: Communication, social, and academic development</i> . Baltimore, MD: Paul H. Brookes.

**EFFECTIVE
INTERVENTION
TABLE 26**

SCHEDULES [CMS, NSP]	
Definition	These interventions involve the presentation of a task list that communicates a series of activities or steps required to complete a specific activity. Schedules are often supplemented by other interventions such as reinforcement. Schedules can take several forms including written words, pictures or photographs, or work stations.
Further Description of Intervention	Schedules are meant to help children understand and manage the daily events in their lives. A schedule is a set of pictures that communicates a sequence of activities for a specific activity or event. Children with ASDs tend to rely on visual information for learning. They also rely on predictable daily routines to keep their world organized. Self-regulation is more easily accomplished when they can predict what will happen next. Schedules have become a routine natural support in classrooms, homes, and other public places. Schedules can be used for any activity including leisure, social interaction, self-care, and housekeeping tasks.
Goal Areas Demonstrating Positive Outcomes	NSP: Self-Regulation CMS: Communication, Social Development, Cognitive Development, Adaptive Behavior, Problem Behavior
Age Range Supported by Evidence	3 to 14 years
Resources	<p>McClannahan, L. E., & Krantz, P. J. (2010). <i>Activity schedules for children with autism: Teaching independent behavior</i> (2nd ed.). Bethesda, MD: Woodbine House.</p> <p>Mesibov, G., Shea, V., & Schopler, E. (2005). <i>The TEACCH approach to autism spectrum disorders</i>. New York, NY: Plenum.</p>

**EFFECTIVE
INTERVENTION**
TABLE 27

SELF-MANAGEMENT [NPDC, NSP]	
Definition	Self-management interventions promote independence by teaching individuals with ASDs to regulate their behavior by recording the occurrence/nonoccurrence of the target behavior and securing reinforcement for doing so. Initial skills development may involve other strategies and may include the task of setting one's own goals. Reinforcement is a component of this intervention, with the individual with an ASD independently seeking and/or delivering reinforcers. Examples include checklists (using checks, smiley/frowning faces), wrist counters, visual prompts, and tokens.
Further Description of Intervention	The goal of self-management for the individual with an ASD is to shift supervision and control from a parent, teacher, caregiver, job coach, or employer to the individual. Three separate skill areas are required for successful self-management. Self-monitoring produces self-awareness of an individual's behavior, and the individual is taught to monitor a targeted behavior. Self-evaluation teaches an individual how to determine if the goal, e.g., reduced self-injury, was met. Self-reinforcement is initiated by the individual after the goal is met.
Goal Areas Demonstrating Positive Outcomes	NSP: Interpersonal, Self-Regulation NPDC: Academic, Behavior, Communication, Social, Transitions
Age Range Supported by Evidence	3 to 18 years
Resources	Koegel, L. K., Koegel, R. L., & Parks, D. R. (1992). <i>How to teach self-management to people with severe disabilities: A training manual</i> . Santa Barbara, CA: University of California.

**EFFECTIVE
INTERVENTION
TABLE 28**

SOCIAL COMMUNICATION INTERVENTION [CMS]	
Definition	These psychosocial interventions involve targeting some combination of impairments such as pragmatic communication skills and the inability to successfully read social situations.
Further Description of Intervention	Even when they are able to communicate verbally, children and adolescents with ASDs often display poor ability to understand most of what is communicated during social conversation. Because children and adolescents with ASDs are less skilled in generalization and transfer of skills, social communication instructions should be offered in multiple settings with consistent intervention programming across trainers. Social communication interventions include Social Stories™, video modeling, social problem solving, pivotal response training, scripting procedures, computer-based interventions, priming procedures, prompting procedures, and self-monitoring.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development
Age Range Supported by Evidence	Birth to 21 years
Resources	Quill, K. A. (2000). <i>Do-watch-listen-say: Social and communication intervention for children with autism</i> . Baltimore, MD, Paul H. Brookes.

**EFFECTIVE
INTERVENTION**
TABLE 29

SOCIAL NARRATIVES [NPDC, CMS, NSP]	
Definition	Story-based interventions identify a target behavior and involve a written description of the situations under which specific behaviors are expected to occur. Most stories aim to increase perspective-taking skills and are written from an “I” or “some people” perspective. The most well-known story-based intervention is Social Stories™. Stories may be supplemented with additional components (e.g., prompting, reinforcement, discussion, etc.). Social Stories™ seeks to answer “who,” “what,” “when,” “where,” and “why” to improve perspective-taking.
Further Description of Intervention	Written narratives describe specific social situations in some detail and are aimed at helping individuals to adjust to situations or to adapt their behavior.
Goal Areas Demonstrating Positive Outcomes	NSP: Interpersonal, Self-regulation CMS: Social Development, Adaptive Behavior, Problem Behaviors NPDC: Behavior, Communication, Social
Age Range Supported by Evidence	6 to 14 years
Resources	Gray, C. (2010). <i>The new social story book</i> (10th ed.). Arlington, TX: Future Horizons.

**EFFECTIVE
INTERVENTION
TABLE 30**

SOCIAL SKILLS INTERVENTION [NPDC, CMS]	
Definition	Social skills intervention is offered as small-group instruction with a shared goal or outcome of learned social skills in which participants can learn, practice, and receive feedback. These interventions seek to build social interaction skills in children and adolescents with ASDs by targeting basic responses (e.g., eye contact, name response) to complex social skills (e.g., how to initiate or maintain a conversation).
Further Description of Intervention	Social skills groups are used to teach ways to appropriately interact with typically developing peers. Social skills groups typically involve small groups of two to eight individuals with disabilities and a teacher or adult facilitator. Most social skill group meetings include instruction, role-playing or practice, and feedback to help learners with ASDs acquire and practice skills to promote positive social interactions with peers.
Goal Areas Demonstrating Positive Outcomes	CMS: Social, Problem Behaviors NPDC: Communication, Social
Age Range Supported by Evidence	3 to 18 years
Resources	Gray, C., 2010. <i>The new social story book</i> (10th anniversary ed.). Arlington, TX: Future Horizons. Baker, J. E. (with Smith-Myles, B.). (2003). <i>Social skills training for children and adolescents with Asperger syndrome and social-communication problems</i> . Shawnee, KS: Autism Asperger Publishing Co.

**EFFECTIVE
INTERVENTION**
TABLE 31

SPEECH GENERATING DEVICES [NPDC]	
Definition	Speech generating devices (SGD) are electronic, portable devices used to teach learners communication skills and provide a means of communication. SGDs can produce either synthetic or digital speech for the user. SGDs may be used with graphic symbols as well as with alphabet keys.
Further Description of Intervention	SGDs can be used effectively from early childhood through high school with children and adolescents with ASDs who have limited or no verbal speech. SGDs are portable devices that allow a parent, teacher, or therapist to program custom vocabularies for the child with an ASD. There are different types of commercially available devices to choose from, but the device must fit the child's age and communication level. Most devices have a display screen that shows pictures and symbols of preferred objects and activities. After the child is taught to touch one of the objects, the device's synthetic voice says the name or phrase that expresses what the child wants to say. For example, if the child touches the image of a swing set, the device might say, "I want to swing."
Goal Areas Demonstrating Positive Outcomes	NPDC: Communication, Social
Age Range Supported by Evidence	3 to 18+ years
Resources	<p>Sigafoos, J., Drasgow, E., Halle, J. W., O'Reilly, M., Seely-York, S., Edrisinha, C., & Andrews, A. (2004). Teaching VOCA use as a communicative repair strategy. <i>Journal of Autism and Developmental Disorders</i>, 34(4), 411-422.</p> <p>Olive, M. L., de la Cruz, B., Davis, T. N., Chan, J. M., Lang, R. B., O'Reilly M. F., & Dickson, S. M. (2007). The effects of enhanced milieu teaching and a voice output communication aid on the requesting of three children with autism. <i>Journal of Autism and Developmental Disorders</i>, 37, 1505-1513.</p>

**EFFECTIVE
INTERVENTION
TABLE 32**

STRUCTURED WORK SYSTEMS [NPDC]	
Definition	Structured work systems are visually and physically structured sequences that provide opportunities for learners to practice previously taught skills, concepts, or activities.
Further Description of Intervention	Structured work systems are an element of structured teaching developed by Division TEACCH. Structured teaching, as defined by Division TEACCH, is an instructional strategy that emphasizes visual supports. Its aims are to increase and maximize independent functioning and reduce the frequent need for teacher correction and reprimand. The individual work system is defined as a visually organized space where learners independently practice skills that have been mastered previously under the direct supervision of an adult. A work system visually communicates at least four pieces of information to the learner: the tasks the learner is supposed to do, how much work there is to be completed, how the learner knows he/she is finished (progress towards goal), and what to do when he/she is finished.
Goal Areas Demonstrating Positive Outcomes	NPDC: Academic, Transitions
Age Range Supported by Evidence	3 to 18+ years
Resources	Schopler, E., Mesibov, G., & Hearsey, K. (1995). Structured teaching in the TEACCH system. In E. Schopler & G. Mesibov (Eds.), <i>Learning and cognition in autism</i> (pp. 243-268). New York, NY: Plenum Press.

**EFFECTIVE
INTERVENTION**
TABLE 33

SUPPORTED EMPLOYMENT [CMS]	
Definition	Supported employment focuses on enabling a person with an ASD to secure and maintain a paid job in a regular work environment by providing appropriate training and support.
Further Description of Intervention	Supported employment services are designed to assist older individuals with ASDs who often experience challenges with learning, social contact, and managing their behavior that prevent them from meaningful opportunities for employment. Supported employment services are designed to offer intensive individualized supports to prepare the individual for employment. During the transition from school to work, most supported employment programs do the following to prepare learners to work: assess interests and skill levels, identify potential work places that align with the individual's work strengths, provide assistance during the transition from school to work place, and provide a job coach.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development, Cognitive Development, Adaptive Behavior
Age Range Supported by Evidence	18 years through adulthood
Resources	Wehman, P., Inge, K., Revell, W., & Brooke, V. 2006. <i>Real work for real pay: Inclusive employment for people with disabilities</i> . Baltimore MD: Paul H. Brookes.

**EFFECTIVE
INTERVENTION
TABLE 34**

TECHNOLOGY-BASED TREATMENT [CMS]	
Definition	Technology-based treatments present instructional materials using the medium of computers or related technologies.
Further Description of Intervention	Treatment studies of children with ASDs have demonstrated measurable improvements in communication, attentional control, self-regulation, problem solving, and emotional recognition using different forms of technology. Some technology-based interventions are designed for long-term use as assistive tools (e.g., voice-output communication devices) whereas others are introduced as a provisional instructional aide to be faded after the child's training goals are achieved. Cell phones, Bluetooth headsets, PDAs, MP3 players, tablets, and video and auditory recording equipment, and computers are a few examples of the most popular devices currently available for use in treatment programs. These devices can be used to provide tactile and auditory prompts, model appropriate behavior, improve reading skills and conversational speech, and promote spontaneous requesting. These easy-to-operate devices are low cost, readily available forms of technology that can be beneficial for treating children with ASDs if appropriately applied.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development, Cognitive Development, Sensory and Motor Development, Problem Behavior
Age Range Supported by Evidence	3 to 21 years
Resources	SEAT Center ATIA. (2009). <i>Assistive technology and autism spectrum disorders: Research-based practice and innovation in the field</i> . Chicago, IL: Illinois State University.

**EFFECTIVE
INTERVENTION**
TABLE 35

COMPUTER-AIDED INSTRUCTION [NPDC, CMS]	
Definition	Computer-aided instruction (CAI) includes the use of computers to teach academic skills and to promote communication and language development and skills. It includes computer modeling and computer tutors.
Further Description of Intervention	CAI can be used effectively to address academic and communication/language skills. In the academic domain, evidence-based research focused on vocabulary and grammar. Within the communication domain, evidence-based studies targeted communicative functions and initiations. One study taught the recognition and prediction of emotions in others.
Goal Areas Demonstrating Positive Outcomes	CMS: Communication, Social Development, Cognitive Development NPDC: Academic, Communication, Social
Age Range Supported by Evidence	3 to 18 years
Resources	Goldsmith, T. R., & LeBlanc, L. A. (2004). Use of technology in interventions for children with autism. <i>Journal of Early Intensive Behavioral Intervention</i> , 1(2), 166-178.

**EFFECTIVE
INTERVENTION
TABLE 36**

VISUAL SUPPORTS [NPDC]	
Definition	Visual supports are tools that enable a learner to independently track events and activities.
Further Description of Intervention	Visual supports are any tool presented visually that offers guidance to an individual as he or she moves through the day. Visual supports might include, but are not limited to, pictures, written words, objects within the environment, arrangement of the environment or visual boundaries, schedules, maps, labels, organization systems, timelines, and scripts. They are used across settings to support individuals with ASDs. Visual supports have been used effectively in classroom settings and home settings. Visual supports are intended to be used as one component of comprehensive programming for individuals with ASDs.
Goal Areas Demonstrating Positive Outcomes	NPDC: Academic, Communication, Play, Social, Transition
Age Range Supported by Evidence	3 to 14 years
Resources	Johnston, S., Nelson, C., Evans, J., & Palazolo, K. (2003). The use of visual supports in teaching young children with autism spectrum disorder to initiate interactions. <i>Augmentative and Alternative Communication</i> , 19(2), 86-103.

**EFFECTIVE
INTERVENTION**
TABLE 37

ARIPIPRAZOLE [AHRQ]	
Definition	Aripiprazole is approved by the Food and Drug Administration for treating irritability in children 6 to 17 years old with Autistic Disorder. Aripiprazole has demonstrated improvement in challenging behaviors including emotional distress, aggression, hyperactivity, and self-injury. Social or communication symptoms were not improved with this medication.
Further Description of Intervention	<p>Two studies using aripiprazole demonstrated improvement in a parent-reported measure of challenging behavior. A parent-reported hyperactivity and noncompliance measure also showed significant improvement. Repetitive behaviors showed improvement with aripiprazole.</p> <p>Aripiprazole also caused significant side effects including marked weight gain, drowsiness, and risk of extrapyramidal symptoms (side effects, including muscle stiffness or tremor, that occur in individuals taking antipsychotic medications). These side effects may limit use of this drug and the risks must be balanced with the benefit.</p> <p>At a minimum, yearly monitoring of lipids and fasting blood sugar is recommended. The child's weight and body mass index (BMI) are monitored during each physician visit.</p>
Goal Areas Demonstrating Positive Outcomes	AHQ: Irritability, Emotional Distress, Aggression, Hyperactivity, Self-Injury
Age Range Supported by Evidence	6 to 17 years
Resources	Marcus, R. N., Owen, R., Kamen, L., Manos, G., McQuade, R. D., Carson, W. H., & Aman, M. G. (2009). A placebo-controlled, fixed-dose study of aripiprazole in children and adolescents with irritability associated with autistic disorder. <i>Journal of the American Academy for Child and Adolescent Psychiatry</i> , 48(11), 1110-1119.

**EFFECTIVE
INTERVENTION
TABLE 38**

METHYLPHENIDATE [StART]	
Definition	Evidence indicates that methylphenidate, a psychostimulant, is effective in reducing symptoms of inattention and hyperactivity in children with ASDs. Psychostimulants treat hyperactivity and inattention in patients diagnosed with attention deficit hyperactivity disorder (ADHD). However, the response rates are lower in children with ASDs than those seen in children with typical ADHD. Side effects such as significant agitation, which were reported in open-label studies, are not documented in controlled studies. Research is lacking on the benefit and tolerability of sustained release preparations of methylphenidate and other psychostimulants.
Further Description of Intervention	Methylphenidate improved symptoms associated with hyperactivity in the ASD population and could possibly improve social communication. Psychostimulants (e.g., methylphenidate) have been shown to be ineffective in the treatment of irritability. Psychostimulants are ineffective in the treatment of stereotyped behaviors.
Goal Areas Demonstrating Positive Outcomes	StART: Inattention, Hyperactivity
Age Range Supported by Evidence	6 to 17 years
Resources	Posey, D. J., Aman, M. G., McCracken, J. T., Scahill, L., Tierney, E., Vitiello, B.,... McDougle, C. J. (2007). Positive effects of methylphenidate on inattention and hyperactivity in pervasive developmental disorders: An analysis of secondary measures. <i>Biological Psychiatry</i> , 61, 538–544. Research Units on Pediatric Psychopharmacology Autism Network. (2005). Randomized, controlled, crossover trial of methylphenidate in pervasive developmental disorders with hyperactivity. <i>Archives of General Psychiatry</i> , 62, 1266–1274.

**EFFECTIVE
INTERVENTION**
TABLE 39

RISPERIDONE [StART, AHRQ]	
Definition	Risperidone has been approved by the Food and Drug Administration (FDA) for treating irritability in children 6 to 17 years of age with Autistic Disorder. Risperidone was shown to be effective in treating aggression, hyperactivity, and irritability. There is marginal evidence of beneficial effect on sleep problems. Risperidone's benefit in suppressing maladaptive behavior appears to be maintained for at least 6 months following the initiation of treatment.
Further Description of Intervention	Medical treatment with risperidone can potentially reduce emotional distress, aggression, hyperactivity, repetitive behavior, and self-injury. The most significant side effects are weight gain (with increased risk of metabolic complications) and sedation (drowsiness, particularly at the beginning of treatment or with dosage increases). The incidence of extrapyramidal symptoms, i.e., muscle stiffness or tremor, is low. These side effects may limit the use of risperidone and the risks must be balanced with the benefit. At a minimum, yearly monitoring of lipids and fasting blood sugar is recommended. The child's weight and body mass index (BMI) are monitored during each physician visit. Combining parent training with risperidone treatment suggested that adding parent training to medication usage increased adaptive behavior and decreased noncompliance and irritability/aggression in children with ASDs.
Goal Areas Demonstrating Positive Outcomes	AHRQ: Emotional Distress, Aggression, Non-compliance, Hyperactivity, Repetitive Behaviors, and Self-injury StART: Maladaptive Behavior, Hyperactivity, and Irritability
Age Range Supported by Evidence	5 to 16 years
Resources	Aman, M. G., Hollway, J. A., McDougle, C. J., Scahill, L., Tierney, E., McCracken, J. T.,... Posey, D. J. (2008). Cognitive effects of risperidone in children with autism and irritable behavior. <i>Journal of Child and Adolescent Psychopharmacology, 18</i> (3), 227-236. Research Units on Pediatric Psychopharmacology Autism Network. (2005). Risperidone treatment of autistic disorder: Longer time benefits and blinded discontinuation after 6 months. <i>American Journal of Psychiatry, 162</i> (7), 1361-1369

Review Summaries

CHAPTER 4



CHAPTER 4

This key appears throughout this chapter to help the reader quickly differentiate the levels of research support for interventions reported by each review.

KEY

**Effective, Established,
Evidence-based, or Level 1**

Ineffective

**Emerging, Marginal, or
Level 2**

**Unestablished, Insufficient
Evidence, or Level 3**

Introduction

To make the best decisions about intervention options for persons with autism spectrum disorders (ASDs), individuals with ASDs and their families, healthcare professionals, educators, and other service providers need up-to-date information about intervention choices. The Missouri Autism Guidelines Initiative selected six nationally recognized systematic reviews of ASD interventions as the focus of this Guide. Together these reviews provide up-to-date information on the effectiveness of a broad array of ASD interventions which include behavioral, educational, medical, allied health, and complementary and alternative interventions. Two of these reviews were being updated at the time of publication (National Standards Project and the National Professional Development Center). Information about the release of these updated reviews will be reported at www.autismguidelines.dmh.mo.gov.

Review Summaries

This chapter provides summaries of each of the six reviews. The summaries include data on the reviews' objectives, methods, and results. The citations for the research reviews are listed for individuals who choose to refer to or read the original publications. The review summaries are printed in the following order:

- National Professional Development Center (NPDC) pages 117 to 122
- Centers for Medicare and Medicaid Services (CMS) pages 123 to 146
- National Standards Project (NSP) pages 147 to 162
- Agency for Healthcare Research and Quality (AHRQ) pages 163 to 170
- Stanford Autism Research Team (StART) pages 171 to 175
- Comprehensive Treatment Models (CTM) pages 176 to 180

The National Professional Development Center on Autism Spectrum Disorders

(NPDC)

CONTEXT

The National Professional Development Center on Autism Spectrum Disorders is a multi-university center to promote the use of evidence-based practice for children and adolescents with autism spectrum disorders. It operates through three sites: the FPG Child Development Institute at the University of North Carolina at Chapel Hill, the M.I.N.D. Institute at the University of California at Davis Medical School, and the Waisman Center at the University of Wisconsin at Madison. The Center provides professional development to teachers and practitioners who serve individuals from birth through 22 years with autism spectrum disorders (ASDs).

Before the Center could promote evidence-based practices, it needed to identify ASD practices with efficacy for children and youth with ASDs. The process used to identify the evidence-based interventions that are the focus of the Center's work is described in the article noted in bold below.

Samuel Odom, PhD, director of the Frank Porter Graham Child Development Institute at the University of North Carolina, collaborated with researchers at the Waisman Center, the M.I.N.D. Institute, and Vanderbilt University on this research. The unit of analysis for this research was defined as focused intervention practices. The researchers defined focused interventions as "individual instructional practices or strategies that teachers and other practitioners use to promote specific outcomes for children with ASDs, such as goals that would appear on IEPs or outcomes on ISSPs" (<http://autismpdc.fpg.unc.edu/content/national-standards-project>).

Odom, S.L., Collet-Klingenberg, L., Rogers, S.J., & Hatton, D.D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders. *Preventing School Failure*, 54(4), 275-282. Retrieved from <http://www.tandf.co.uk/journals>

OBJECTIVES OF THE RESEARCH

- Provide a definition of evidence-based practices
- Describe a process for identifying evidence-based practices
- Identify efficacious ASD practices for children and youth with ASDs
- Describe how teachers and practitioners might use this information

SUMMARY

- Focus of research: focused intervention practices
- Age range: birth to 22 years
- Number of studies reviewed: approximately 360
- Dates of research studies: 1997-2007

METHODS

Evidentiary Criteria. The authors agreed on the following criteria to guide which evidence to accept from a particular study. The study had to

- have been conducted with participants with ASDs ages birth to 22 years,
- have outcomes for those participants as dependent measures,
- demonstrate that the use of a practice resulted in improved outcomes in skills targeted by the intervention, and
- have adequate experimental controls.

Definition of Evidence-based Practice. Reviewers assessed each study using the following definition of evidence-based practice. To be considered an evidence-based practice for individuals with ASDs, efficacy must be established through peer-reviewed research in scientific journals using one of the following methodological criteria:

- **RANDOMIZED OR QUASI-EXPERIMENTAL DESIGN STUDIES.** Different research groups must have conducted at least two high-quality experimental or quasi-experimental group design studies.
- **SINGLE-SUBJECT DESIGN STUDIES.** Three different investigators or research groups must have conducted five high-quality single-subject design studies.
- **COMBINATION OF EVIDENCE.** One high-quality randomized or quasi-experimental group design study and three high-quality single-subject design studies were conducted by at least three different investigators or research groups.

Using this definition of evidence-based practice, the authors conducted a broad literature search and scrutinized the method sections of the articles to assess whether the article met the methodological criteria. If so, it was grouped with other articles about the same intervention practice. For all groups of studies, a second researcher conducted a second review of the articles to make sure the studies met criteria.

RESULTS

From the review of the literature, researchers identified 24 evidence-based practices. The list of evidence-based practices with descriptors is reprinted, with permission, in Table 4.1.

NPDC. EVIDENCE-BASED PRACTICES WITH DESCRIPTORS		TABLE 4.1
EVIDENCE-BASED PRACTICE	DESCRIPTOR	KEY
Behavioral strategies		
Prompting	Behaviorally based antecedent teaching strategy	Effective, Established, Evidence-based, or Level 1
Reinforcement	Behaviorally based consequence teaching strategy	Ineffective
Task analysis and chaining	Behaviorally based antecedent teaching strategy that breaks down steps and links them for prompting	Emerging, Marginal, or Level 2
Time delay	Behaviorally based antecedent teaching strategy that promotes errorless learning	Unestablished, Insufficient Evidence, or Level 3
Computer-aided instruction	The use of computers for varied instruction	
Discrete trial training (DTT)	One-to-one instructional strategy that teaches skills in a planned, controlled, and systematic manner	
Naturalistic interventions	A variety of strategies that closely resemble typical interactions and occur in natural settings, routines and activities	
Parent-implemented interventions	Strategies that recognize and use parents as the most effective teachers of their children	
Peer-mediated instruction/intervention (PMII)	Strategies designed to increase social engagement by teaching peers to initiate and maintain interactions	
Picture exchange communication system (PECS)™	A system for communicating that uses the physical handing over of pictures or symbols to initiate communicative functions	
Pivotal response training (PRT)	An approach that teaches the learner to seek out and respond to naturally occurring learning opportunities	
Positive behavioral support strategies:		
Functional behavior assessment (FBA)	A systematic approach for determining the underlying function or purpose of behavior	
Stimulus control/Environmental modification	The modification or manipulation of environmental aspects known to impact a learner's behavior	
Response interruption/redirection	The physical prevention or blocking of interfering behavior with redirection to more appropriate behavior	

(CONTINUED)

(CONTINUED)

NPDC. IDENTIFIED EVIDENCE-BASED PRACTICES WITH DESCRIPTORS

TABLE 4.1

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

EVIDENCE-BASED PRACTICE	DESCRIPTOR
Functional communication training (FCT)	A systematic practice of replacing inappropriate or ineffective behavior with more appropriate or effective behaviors that serve the same function
Extinction	Behaviorally based strategy that withdraws or terminates the reinforcer of an interfering behavior to reduce or eliminate the behavior
Differential reinforcement (DRA/I/O/L)	Behaviorally based strategies that focus reinforcement on alternative, incompatible, other, or lower rates of the interfering behavior in order to replace it with more appropriate behavior
Self-management	A method in which learners are taught to monitor, record data, report on, and reinforce their own behavior
Social narratives	Written narratives that describe specific social situations in some detail and are aimed at helping the individual to adjust to the situation or adapt their behavior
Social skills training groups	Small group instruction with a shared goal or outcome of learned social skills in which participants can learn, practice, and receive feedback
Structured work systems	Visually and physically structured sequences that provide opportunities for learners to practice previously taught skills, concepts, or activities
Video modeling	Utilizes assistive technology as the core component of instruction and allows for pre-rehearsal of the target behavior or skill via observation
Visual supports	Tools that enable a learner to independently track events and activities
VOCA/Speech Generating Devices (SGD)	Electronic, portable devices used to teach learners communication skills and as a means of communication

NOTE: Reprinted with permission from "Evidence-Based Practices in Interventions for Children and Youth With Autism Spectrum Disorders," by S. L. Odom, L. Collet-Klingenber, S. J. Rogers, and D. D. Hatton, 2010, *Preventing School Failure*, 54, 275-282.

Table 4.1a (below) indicates by the ■ that the studies making up the evidence base for that practice included dependent variables in the domain indicated by that column.

NPDC. EVIDENCE-BASED PRACTICES ■ LEARNER OUTCOME MATRIX KEY		TABLE 4.1A					
EVIDENCE-BASED PRACTICE		ACADEMIC	BEHAVIOR	COMMUNICATION	PLAY	SOCIAL	TRANSITIONS
Behavioral intervention strategies							
Prompting	■						
Reinforcement	■	■	■	■	■		
Task analysis and chaining	■			■	■	■	■
Time delay	■			■	■	■	
Computer-aided instruction	■			■		■	
Discrete trial training (DTT)			■	■			
Naturalistic interventions				■		■	
Parent-implemented interventions		■	■			■	■
Peer-mediated instruction/intervention (PMII)		■	■			■	■
Picture exchange communication system (PECS)		■	■			■	
Pivotal response training (PRT)		■	■		■	■	
Positive behavioral support strategies							
Functional behavior assessment (FBA)		■		■			
Stimulus control/Environmental modifications	■	■			■		
Response interruption/redirection	■	■	■				
Functional communication training (FCT)		■	■				
Extinction		■	■				
Differential reinforcement (DRA/I/O/L)		■		■			
Self-management	■	■	■			■	■
Social narratives		■	■			■	
Social skills training groups				■		■	
Structured work systems	■						■
Video modeling			■	■	■	■	
Visual supports	■		■	■	■	■	■
VOCA/Speech Generating Devices (SGD)				■		■	

NOTE: Reprinted with permission from "Evidence-Based Practices in Interventions for Children and Youth With Autism Spectrum Disorders," by S. L. Odom, L. Collet-Klingenberg, S. J. Rogers, and D. D. Hatton, 2010, *Preventing School Failure*, 54, 275-282.

In addition to identifying efficacious interventions for children and youth with ASDs, the authors sought to describe how the information could be used by teachers and other practitioners. The authors noted that the research literature seldom describes the **implementation** of the intervention practice in enough detail for a practitioner to immediately use the practice. Therefore, after identifying evidence-based practices, the researchers examined thoroughly the publications of each of the evidence-based practices. Based on this analysis, they constructed step-by-step guidelines and checklists to guide teachers and other practitioners in their use of these practices. These materials have been assembled into Web-based modules and evidence-based practice briefs which can be found on the Center's website <http://autismpdc.fpg.unc.edu>.

LIMITATIONS OF THE REVIEW

The review is based on literature published through 2007. New research findings about ASD interventions are being published frequently which will contribute to the list of practices that are determined to be evidence based.

Autism Spectrum Disorders (ASDs) Services, Final Report on Environmental Scan

PREPARED BY IMPAQ INTERNATIONAL, LLC FOR THE CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

CONTEXT

In 2007, about \$160 million was appropriated to federal agencies for autism research and awareness programs. The law authorizing these appropriations specified as one of its goals the promotion of the use of evidence-based interventions for people with ASDs or other developmental disabilities. This legislation also established the Interagency Autism Coordinating Committee (IACC) to coordinate all autism spectrum disorder efforts within the Department of Health and Human Services. A representative from the Centers for Medicare & Medicaid Services is a member of the IACC and co-chairs the Services Subcommittee. One of the priority areas identified by the IACC is research on services and support systems for individuals with ASDs. The Centers for Medicare & Medicaid Services contracted with IMPAQ International, LLC, to prepare this report.

Young, J., Corea, C., Kimani, J., & Mandell, D. (2010). *Autism spectrum disorders (ASDs) services: Final report on environmental scan (pp. 1-59)*. Columbia, MD: IMPAQ International. Retrieved from <http://www.impaqint.com/files/4-content/1-6-publications/1-6-2-project-reports/finalasreport.pdf>

OBJECTIVES OF THE RESEARCH

- Develop data for CMS to use to make policy and funding decisions about which services and support systems for persons with ASDs are effective
- Conduct an environmental scan of the scientific evidence regarding the efficacy, effectiveness, safety, and availability of ASD-related psychosocial services and supports for children, transitioning youth, and adults with ASDs
- Examine ASD services within the context of Medicaid services
- Identify and analyze the relevant cost and funding literature related to ASDs

SUMMARY

- Focus of environmental scan: behavioral and psychosocial interventions
- Age range: children (birth to 16), transitioning youth (17 to 21), adults 21+
- Number of studies reviewed: 271 articles were included in the environmental scan
- Dates of research studies: 1998-2008
- Classification system: evidence-based, emerging, unestablished

METHODS

Populations of Interest. The researchers searched for publications that examined ASD services and supports for children (birth to 16 years of age), transitioning youth (17 to 21 years of age), and adults (21+ years of age).

Search. The search included manuscripts published in English from 1998 to 2008. Research conducted outside of the United States was excluded if the intervention studied could not be readily implemented in the U.S. Medical or pharmaceutical services also were excluded.

Manuscript Rating System. The IMPAQ team used the Campbell Collaborative rating system as a manuscript rating system model to assess the quality of evidence supporting the effectiveness of psychosocial interventions. Each study was rated on a 9-point scale based on the research design with a rating of 9 providing the most rigorous level of evidence and a rating of 1 providing the lowest level of evidence according to the Campbell Criteria.

Classification System for Findings. The IMPAQ research team adapted the intervention categories and descriptions used in the *National Standards Report* for classification of the studies used in the environmental scan. Each intervention was aligned with one of the categories used by the *National Standards Report* based on the descriptions in the reviewed article.

Evaluating Effectiveness of Findings. Using the National Professional Development Center's (NPDC) definition of evidence-based practices (see page 118 for more about this definition) and based on relevant information extracted from each article, the researchers grouped the effectiveness of each intervention into three levels:

- **Level 1: EVIDENCE-BASED INTERVENTIONS.** Interventions fully meet the NPDC criteria for evidence-based practices.
- **Level 2: EMERGING, EVIDENCE-BASED INTERVENTIONS.** Interventions meet some of the NPDC criteria for evidence-based practices, but do not completely fulfill the requirements.
- **Level 3: UNESTABLISHED INTERVENTIONS.** Interventions do not meet any of the NPDC criteria for evidence-based practices.

RESULTS

The CMS research review presents its findings of evidence-based interventions by age groups: children (birth to 16 years of age), transitioning youth (17 to 21 years of age), and adults (21 and older). **Level 1 evidence-based interventions** are presented beginning on page 125. **Level 2 emerging evidence-based interventions** are reported separately beginning on page 132. **Level 3 unestablished interventions** begin on page 139.

LEVEL 1: EVIDENCE-BASED INTERVENTIONS

Note: Information in the first two columns of the following nine tables is reprinted with permission from the CMS report. The examples in italics have been added to assist the reader in understanding the findings. They are included as illustrative of the types of interventions described and do not constitute a recommendation for selection.

Children (birth to 16 years of age). A total of 214 studies covering 31 interventions were reviewed for children. Of these 31 interventions, 15 interventions (48%) were rated as evidence based (see Table 4.2 below).

KEY

Effective, Established, Evidence-based, or Level 1
Ineffective
Emerging, Marginal, or Level 2
Unestablished, Insufficient Evidence, or Level 3

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN		TABLE 4.2
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Antecedent Package (12)	Interventions involving the modifications of events that typically precede the occurrence of a target behavior. These alterations are made to increase the likelihood of success or reduce the likelihood of problems occurring	<i>Examples include offering optional response choices, switching seating arrangement in the classroom, providing a prompt before the response. Antecedent events influence behavior by providing a familiar cue or by momentarily increasing motivation.</i>
Behavioral Package (31)	Interventions designed to reduce problem behavior and teach functional alternative behaviors or skills through the application of basic principles of behavior change	<i>This class of intervention procedures includes teaching skills that are incompatible with problem behavior or replace negative behavior with positive responses. A large number of techniques are involved such as shaping, differential reinforcement, self-management, video modeling, and functional communication training.</i>
Cognitive Behavioral Intervention Package (9)	Interventions are designed to change negative or unrealistic thought patterns and behaviors with the aim of positively influencing emotions and life functioning	<i>For higher functioning children, impaired social interaction and impaired emotional expression are addressed by teaching interpersonal problem solving skills and skills for recognizing and understanding their own emotions.</i>
Comprehensive Behavioral Treatment for Young Children (20)	Interventions involving a combination of instructional and behavior change strategies and a curriculum that addresses core and ancillary symptoms and behaviors of ASD	<i>Intensive intervention of 25 to 40 hours per week that addresses most if not all developmental domains. Starts with basic techniques including hand-over-hand guidance, shaping, differential reinforcement, discrimination training, imitation and generalization training, modeling, etc. across multiple therapists and settings.</i>

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CMS

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN

TABLE 4.2

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Joint Attention Intervention (7)	Interventions involving teaching a child to respond to the nonverbal social bids of others or to initiate joint attention interactions	<i>Joint attention is the child's ability to attend to an object, person, or activity of interest along with another person. A typical example of teaching joint attention is as follows: The child is prompted by the adult, who points or gazes at a nearby object. If the child looks at the object and then looks back at (the eyes of) the person who initiated the prompt to "look," the child is reinforced. After the child learns to coordinate visual gaze between the object of interest and another person, the next phase is to teach the child to initiate a request for joint attention from an adult or peer.</i>
Multi-component Package (5)	These interventions involve a combination of multiple treatment procedures that are derived from different fields of interest or different theoretical orientations. These treatments do not better fit one of the other treatment "packages" in this list nor are they associated with specific treatment programs	<i>This category of intervention studies combines several different intervention procedures to address a variety of treatment issues, including caregiver-based intervention, ruminative vomiting, cognitive training with elevated boards and sign language, teaching nonverbal children useful speech, and parental bonding.</i>
Naturalistic Teaching Strategies (NTS) (6)	Interventions involving using primarily child-directed interactions to teach functional skills in the natural environment. They often focus on providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts	<i>Examples of skills that can be taught using NTS are natural speech production including basic speech sounds, signing to communicate desires, play behavior, and social skills. NTS is suitable for use by parents, teachers, and older siblings because it is learning presented in an entertaining way. Reinforcers are selected by the child and the child's preference is assessed often to keep motivation to learn high.</i>

(CONTINUED)

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CMS

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN			TABLE 4.2				
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES					
Peer Training Package (10)	These interventions involve teaching children without disabilities strategies for facilitating play and social interactions with children on the autism spectrum. Peers often include classmates or siblings	<i>Typical peers are taught to initiate play with children with ASDs by sharing, offering assistance, prompting play themes, and showing a similar interest in an object. Teachers and parents facilitate learning this way by reminding the typical peer to initiate play strategies. The goal is to teach typical peers how to engage children with ASDs.</i> <i>Targeted peer-mediated skills include greetings, brief conversation, play, making simple requests, and sharing toys. Related benefits of peer training are decreased stereotypic behavior, sustained interactions, broader responsiveness to initiations, and decreased self-stimulatory behaviors.</i>	<p>KEY</p> <table border="1"> <tr> <td>Effective, Established, Evidence-based, or Level 1</td> </tr> <tr> <td>Ineffective</td> </tr> <tr> <td>Emerging, Marginal, or Level 2</td> </tr> <tr> <td>Unestablished, Insufficient Evidence, or Level 3</td> </tr> </table>	Effective, Established, Evidence-based, or Level 1	Ineffective	Emerging, Marginal, or Level 2	Unestablished, Insufficient Evidence, or Level 3
Effective, Established, Evidence-based, or Level 1							
Ineffective							
Emerging, Marginal, or Level 2							
Unestablished, Insufficient Evidence, or Level 3							
Picture Exchange Communication System (PECS) (10)	This intervention involves the application of a specific augmentative and alternative communication system based on behavioral principles that are designed to teach functional communication to children with limited verbal and/or communication skills	<i>Initiating more communications and increased interaction with peers are expected outcomes with PECS. PECS teaches initiation of social communication starting with requesting, then discrimination of desired objects, and progressing to spontaneous commenting. Can be used to reduce behavioral problems when functional communication is absent.</i>					
Schedules (4)	Interventions involving the presentation of a task that communicates a series of activities or steps required to complete a specific activity. Schedules are often supplemented by other interventions such as reinforcement	<i>Self-regulation is one benefit of using activity schedules. Schedules can take several forms including written words, pictures or photographs, or work stations. Activity schedules are effective for children 3 to 14 years old. An effective way to increase on-task and transitioning behavior as well as independence.</i>					

(CONTINUED)

(CONTINUED)

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN

TABLE 4.2

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Social Communication Intervention (4)	<p>These psychosocial interventions involve targeting some combination of impairments such as pragmatic communication skills and the inability to successfully read social situations</p>	<p><i>Social communication intervention (SCI) seeks to train parents to adapt their communication style and tailor it to their child's individual language ability. Children with autism require a high level of adapted parental communication. SCI aims to increase the quality of parental adaptation and use of language with their child. This intervention focuses on enhancing social communication skills through interactions with the child's primary social partners in natural environments. SCI promotes increased peer-directed comments, as well as broader and more complex use of language and vocabulary. Using a child's name to gain their attention has been shown to increase with SCI. Spontaneous speech directed toward the interventionist and the parent increased with SCI training.</i></p>
Social Skills Package (9)	<p>These interventions seek to build social interaction skills in children with ASD by targeting basic responses (e.g., eye contact, name response) to complex social skills (e.g., how to initiate or maintain a conversation)</p>	<p><i>This practice typically uses structured group settings in which behavioral techniques (e.g., video modeling, peer modeling, theory of mind constructs) are used to teach initiation of social contact. Emphasis is on creating highly structured opportunities to engage in social behavior with peers and generalizing those behaviors to other settings, e.g., community and school settings.</i></p>

(CONTINUED)

(CONTINUED)

CMS

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN			TABLE 4.2
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Story-based Intervention Package (16)	These treatments involve a written description of the situations under which specific behaviors are expected to occur. Stories may be supplemented with additional components (e.g., prompting, reinforcement, discussion, etc.)	<i>A child with an ASD can read the story, listen to a recorded story, or view a video of the story with modeled characters. In some cases the story can be read to the child with an ASD by a peer. Skills targeted in story-based interventions include appropriate social behavior, delaying echolalia, reduced anxiety, greetings, and self-help skills such as hand washing, sharing toys, preventing tantrums, requesting to play, and responding to verbal directions.</i>	
Structured Teaching (3)	This intervention involves a combination of procedures that rely on the physical organization of a setting, predictable schedules, and individualized use of teaching methods. These treatment programs may also be referred to as TEACCH	<i>TEACCH offers a highly structured learning environment designed to address most if not all of the educational and social skills typically acquired in the special education classroom. Emphasis is on designing an individualized, comfortable learning space using basic behavioral prompts and techniques known to promote learning. Work areas are designed for minimal distraction and maximum access to learning materials. Schedules that define a consistent daily routine are a major stimulus in the TEACCH environment as is prompting and contingent reinforcement for successful responding.</i>	

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

CHAPTER 4

(CONTINUED)

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR CHILDREN

TABLE 4.2

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Technology-based Treatment (11)	These interventions require the presentation of instructional materials using the medium of computers or related technologies	<i>Examples of skill development in children with autism using computers or computer-assisted technologies include enhancing vocal sounds, enhancing social problem solving, and using a computer-animated tutor for vocabulary and language development. Other examples include using a personal digital assistant to increase personal independence and improving reading, literacy, and communication skills using interactive multimedia computers. Computer-based video instruction has been used to teach students to respond verbally to questions and make purchases.</i>

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Transitioning Youth (17 to 21 years of age). The report reviewed studies providing evidence on 15 different interventions for transitioning youth with ASDs. Only one intervention, Antecedent Package (see Table 4.3 below), was found to be Level 1 evidence-based.

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR TRANSITIONING YOUTH

TABLE 4.3

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Antecedent Package (2)	Interventions involving the modifications of events that typically precede the occurrence of a target behavior. These alterations are made to increase the likelihood of success or reduce the likelihood of problems occurring	<i>Examples include offering optional response choices, switching seating arrangements in the classroom, providing a prompt before the response. Antecedent events influence behavior by providing a familiar cue or by momentarily increasing motivation.</i>

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Adults (21 years and older). Eleven studies provided evidence of effectiveness for interventions for adults with ASDs. Only three interventions were found to be Level 1 evidence-based (see Table 4.4, below).

CMS. LEVEL 1: EVIDENCE-BASED INTERVENTIONS FOR ADULTS			TABLE 4.4				
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES					
Behavioral Package (5)	Interventions are designed to reduce problem behavior and teach functional alternative behaviors or skills through the application of basic principles of behavior change	<i>This class of intervention procedures includes teaching skills that are incompatible with problem behavior or that replace negative behavior with positive responses. It includes a large number of techniques such as shaping, differential reinforcement, self-management, video modeling, and functional communication training.</i>	<p>KEY</p> <table border="1"> <tr> <td>Effective, Established, Evidence-based, or Level 1</td> </tr> <tr> <td>Ineffective</td> </tr> <tr> <td>Emerging, Marginal, or Level 2</td> </tr> <tr> <td>Unestablished, Insufficient Evidence, or Level 3</td> </tr> </table>	Effective, Established, Evidence-based, or Level 1	Ineffective	Emerging, Marginal, or Level 2	Unestablished, Insufficient Evidence, or Level 3
Effective, Established, Evidence-based, or Level 1							
Ineffective							
Emerging, Marginal, or Level 2							
Unestablished, Insufficient Evidence, or Level 3							
Structured Teaching (3)	This intervention involves a combination of procedures that rely on the physical organization of a setting, predictable schedules, and individualized use of teaching methods. These treatment programs may also be referred to as TEACCH	<i>TEACCH offers a highly structured learning environment designed to address most if not all of the educational and social skills typically acquired in the special education classroom. Emphasis is on designing an individualized, comfortable learning space using basic behavioral prompts and techniques known to promote learning. Work areas are designed for minimal distraction and maximum access to learning materials. Schedules that define a consistent daily routine are a major stimulus in the TEACCH environment as is prompting and contingent reinforcement for successful responding.</i>					
Supported Employment (3)	The intervention focuses on enabling a person with an ASD to secure and maintain a paid job in a regular work environment by providing all appropriate training and support	<i>Successful skill building in supported employment includes but is not limited to behavioral techniques from antecedent package, e.g., offering choice, simplifying task demands, using visual schedules and offering prompts in multiple ways, then fading the prompts. Behavioral package techniques are often used to shape appropriate work site skills, e.g., contingent reinforcement, contracting, task analysis, and functional communication training are but a few of the effective ways to ensure successful work site behavior.</i>					

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS

Note: Information in the first two columns of the following tables is taken directly from tables in the CMS report, with permission. The examples in italics have been added to assist the reader in understanding the findings. They are included as illustrative of the types of interventions described and do not constitute a recommendation for selection.

Children (birth to 16 years of age.) Based on a review of 53 studies, 13 interventions had adequate evidence to be categorized as Level 2 emerging evidence-based (see Table 4.5 below).

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR CHILDREN			TABLE 4.5
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Academic Interventions (4)	These interventions involve the use of traditional teaching methods to improve academic performance	<i>Examples include use of colored overlays and use of speech and print feedback to improve spelling.</i>	
Augmentative and Alternative Communication (ACC) Device (3)	These interventions involved the use of high or low technologically sophisticated devices to facilitate communication. Examples include but are not restricted to: pictures, photographs, symbols, communication books, computers, or other electronic devices	<i>Communication, choice, and turn-taking boards that use a collection of images to convey a thought are all examples of devices used to supplement or replace natural speech or the ability to write messages. An example of ACC is computer-generated speech which is used to promote increased initiations and appropriate responding to others.</i>	
Developmental Relationship-based Treatment (6)	These treatments involve a combination of procedures that are based on developmental theory and emphasize the importance of building social relationships	<i>Examples of this intervention approach include teaching non-verbal communication, requesting, turn taking, initiation, greetings, and requests for help. This approach is child initiated and highly socially interactive. Trained parent involvement by prompting and modeling for the child is critical for success in this approach.</i>	
Initiation Training (2)	These interventions involve directly teaching individuals with ASDs to initiate interactions with their peers	<i>This approach to teaching initiation offers group opportunities defined by a social skills curriculum to initiate contact in a natural setting. Skill building focuses on emotional recognition, perspective taking, and group problem solving. Trained parent involvement is essential to generalization of initiation responding to other settings.</i>	

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CMS

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR CHILDREN			TABLE 4.5
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Language Training (Production) (4)	These interventions have as their primary goal to increase speech production	<i>The goal of this approach is to increase expressive language production. Treatment is composed of elements from discrete trial learning, natural environment teaching, and incidental teaching procedures. Teaching techniques incorporate direct instruction and can be effective in increasing and maintaining responsive and spontaneous speech production in a child with autism.</i>	
Massage/Touch Therapy (2)	These interventions involve the provision of deep tissue stimulation	<i>Studies suggest that massage therapy can be used to reduce stereotypic behavior and increase on-task responding and social relatedness. Less touch aversion, deeper sleep, and fewer autistic symptoms are also suggested as massage treatment outcomes.</i>	
Modeling (9)	These interventions rely on an adult or peer providing a demonstration of the target behavior that should result in an imitation of the target behavior by the individual with an ASD	<i>For children with autism, video modeling has been used to increase social initiation skills, shared play engagement, and imitation of socially appropriate behaviors. Other examples of video modeling include combining other strategies such as contingent reinforcement to teach conversational and self-care skills to children with autism. Use of video modeling to teach perspective taking has been less successful especially for generalized perspective taking in novel environments.</i>	

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

(CONTINUED)

(CONTINUED)

CMS

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR CHILDREN

TABLE 4.5

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Music Therapy (4)	These interventions seek to teach individual skills or goals through music	<i>Music therapists use music to teach children with autism to communicate and express feelings. Use of music can be structured to address behavioral, social, physical, sensory-motor, and cognitive abilities. The most notable effects are on verbal and gestural communicative skills. The music therapist reinforces singing, listening, moving, playing instruments, and other activities in a prescribed manner to develop skills in the above areas. The most frequently used interventions are interactive instrument playing, musical instrument instruction, interactive singing, and choice of instrument and song.</i>
Pivotal Response Treatment (PRT) (5)	This treatment is also referred to as PRT, Pivotal Response Teaching, and Pivotal Response Training. PRT focuses on targeting “pivotal” behavioral areas – such as motivation to engage in social communication, self-initiation, self-management, and responsiveness to multiple cues, with development of these areas having the goal of very widespread and fluently integrated collateral improvements	<i>For children with autism, the abilities that are most “pivotal” to all areas of development are communication, cognition, and social-emotional functioning. Improvement in these areas promotes acquisition and generalization of new skills that were not specifically targeted. PRT as a treatment provides maximum motivation for the child to respond by allowing the child to choose the activity, receive a clear instruction, and gain a reinforcer for a successful attempt. The reinforcer is the object of the child’s initial choice. PRT takes advantage of naturally occurring teaching opportunities and uses naturally occurring consequences to strengthen behavior.</i>

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CMS

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR CHILDREN		TABLE 4.5
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Reductive Package (3)	These interventions rely on strategies designed to reduce problem behaviors in the absence of increasing alternative appropriate behaviors	<i>When behaviors become dangerous, consideration is given to reductive treatment procedures, for example, when a child with autism repeatedly ingests non-edible objects (pica behavior). It has been shown that foods that are aversive to the child can be delivered contingently to effectively reduce the pica behavior. Most reductive procedures use a combination of reinforcement and punishment procedures to reduce severe negative behavior. However, more positive approaches such as functional assessment, differential reinforcement of incompatible or alternative behavior, and antecedent interventions are being developed to offset use of aversive approaches.</i>
Scripting (3)	These interventions involve developing a verbal and/or written script about a specific skill or situation which serves as a model for the child with ASD. Scripts are usually practiced repeatedly before the skill is used in the actual situation	<i>Examples of teaching children with autism using scripts include targeting elements of conversational speech, prompting engagement in conversational exchanges, and initiating socially to peers. Scripted prompts can be delivered by trained peers by using printed text that is slowly faded out, or by using embedded text for children able to read words.</i>
Self-management (6)	These interventions involve independence by teaching individuals with ASD to regulate their behavior by recording the occurrence/non-occurrence of the target behavior, and securing reinforcement for doing so. Initial skills development may involve other strategies and may include the task of setting one's own goals	<i>Self-management combines techniques of self-assessment, self-recording, and self-reinforcement to reduce repetitive or disruptive behaviors (e.g., vocalizations, body movements) and improve on-task behavior. The student is taught to recognize the targeted behavior and record its occurrence. The student is then taught how to self-reinforce when a specified times elapses without the occurrence of the targeted behavior.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

(CONTINUED)

(CONTINUED)

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR CHILDREN

TABLE 4.5

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Theory of Mind (ToM) Training (2)	These interventions are designed to teach individuals with ASDs to recognize and identify mental states (i.e., a person's thoughts, beliefs, intentions, desires and emotions) in oneself or in others and to be able to take the perspective of another person in order to predict their actions	<i>Theory of mind training has been used to overcome an inability to appreciate humor and the interests of a peer in conversation. Improving ToM training theoretically increases emotional recognition and conversational skills, improves the ability to better interpret others' perceptions, and predict and explain the behaviors of others.</i>

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Transitioning Youth (17 years of age to 21 years of age). Three interventions were rated as Level 2 emerging evidence-based for transitioning youth (see Table 4.6 below).

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR TRANSITIONING YOUTH

TABLE 4.6

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Behavioral Package (3)	Interventions are designed to reduce problem behavior and teach functional alternative behaviors or skills through the application of basic principles of behavior change	<i>Examples can include but are not limited to: behavioral sleep package, behavioral toilet training/dry bed training, chaining, contingency contracting, contingency mapping, delayed contingencies, differential reinforcement strategies, discrete trial teaching, functional communication training, generalization training, noncontingent escape with instructional fading, progressive relaxation, reinforcement, scheduled awakenings, shaping, stimulus-stimulus pairing with reinforcement, successive approximation, and task analysis.</i>

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CMS

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR TRANSITIONING YOUTH		TABLE 4.6
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Social Skills Package (6)	These interventions seek to build social interaction skills in children with ASDs by targeting basic responses (e.g., eye contact, name response) to complex social skills (e.g., how to initiate or maintain a conversation)	<i>This practice typically uses structured group settings in which behavioral techniques (e.g., video modeling, peer modeling, peer instruction, theory of mind constructs) are used to teach initiation of social contact. Emphasis is on creating highly structured opportunities to engage in social behavior with peers and generalizing those behaviors to other settings, e.g., community and school settings. Typical skills taught in this setting are sharing, turn-taking, eye contact, following social rules, and using greetings and names.</i>
Technology-based Treatment (2)	These interventions require the presentation of instructional materials using the medium of computers or related technologies	<i>Examples of technology-based treatment include many different options such as computer-aided teaching, computer-based assistance in verbal and written communication, learning academics, navigating environments, seeking assistance when lost, recognizing emotions, and interacting socially. Personal organization, self-help, and academic skills are other areas where the right assistive technology can make a difference. Touch screens that offer access to instructional applications are being used more frequently to teach skills in different areas of personal development.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Adults (21 years of age and older). Only one intervention was rated in Level 2 emerging evidence-based interventions for adults (see Table 4.7 below).

CMS. LEVEL 2: EMERGING EVIDENCE-BASED INTERVENTIONS FOR ADULTS			TABLE 4.7
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Schedules (2)	Interventions involving the presentation of a task that communicates a series of activities or steps required to complete a specific activity. Schedules are often supplemented by other interventions such as reinforcement	<i>Independent choice making and active engagement in adults is increased when participants are allowed to choose their tasks within the context of an activity schedule. With the allowance of choice making within the activity schedule, on-task behaviors are more likely to improve and inappropriate behavior is more likely to decrease.</i>	

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

LEVEL 3: UNESTABLISHED INTERVENTIONS

Unestablished interventions include those that do not meet any of the NPDC criteria for evidence-based practices due to the poor quality of studies or the lack of studies that show positive results.

Children (birth to 16 years of age).

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR CHILDREN			TABLE 4.8
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	KEY
Auditory Integration Training (1)	This intervention involves the presentation of modulated sounds through headphones in an attempt to retrain an individual's auditory system with the goal of improving distortions in hearing or sensitivities to sound	<i>Proponents of this training report that it improves ability to process sound and therefore leads to improved ability to attend to sounds, communicate, and stay engaged during social contact.</i>	Effective, Established, Evidence-based, or Level 1
Exercise (1)	These interventions involve an increase in physical exertion as a means of reducing problem behaviors or increasing appropriate behavior	<i>Exercise is used as an adjunct to traditional behavioral interventions. Areas of functioning addressed by exercise are weight loss, increased attention, and increased fitness levels as indicated by changes in balance, speed, agility, strength, flexibility, and endurance. Activities include use of the treadmill, swimming, and jogging. Exercise has been used to decrease inappropriate behaviors such as rocking, spinning, head nodding, hand flapping, object tapping, and some aggressive and self-injurious behaviors.</i>	Ineffective
Exposure Package (1)	These interventions require that the individual with ASD increasingly face anxiety-provoking situations while preventing the use of maladaptive strategies used in the past under these conditions	<i>Examples of graduated exposure to anxiety-provoking situations or to stimuli that produce hypersensitive responses include teaching typical responding to the presence of lights, aversive touch, dental procedures, sounds, smells, and taste. Introduction and acceptance of lesser preferred foods is one example of the use of an exposure package.</i>	Emerging, Marginal, or Level 2
			Unestablished, Insufficient Evidence, or Level 3

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR TRANSITIONING YOUTH

TABLE 4.9

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Augmentative and Alternative Communication (ACC) Device (1)	These interventions involved the use of high or low technologically sophisticated devices to facilitate communication. Examples include but are not restricted to: pictures, photographs, symbols, communication books, computers, or other electronic devices	<i>One example of a low-tech approach to ACC is using a picture communication board. Pairing visual cues with verbal instruction is reported to improve receptivity to picture communication. This approach may also increase positive behavior, improve management of transitions between activities, and promote improved self-management.</i>
Cognitive Behavioral Intervention Package (1)	Interventions designed to change negative or unrealistic thought patterns and behaviors with the aim of positively influencing emotions and life functioning	<i>Increased understanding of social and emotional expression is one way that cognitive behavioral intervention is used. With parents, teachers and peers as role models, focused interventions are used to teach interpersonal problem solving, knowledge of emotions, and initiating social interactions.</i>
Exercise (1)	These interventions involve an increase in physical exertion as a means of reducing problem behaviors or increasing appropriate behavior	<i>Sitting on a therapy ball sets the occasion for increased active movement and optimal arousal. In one study, in-seat behavior and engagement were increased by offering therapy balls to sit on.</i>
Initiation Training (1)	These interventions involve directly teaching individuals with ASDs to initiate interactions with their peers	<i>In this example, social initiations by adolescents with autism toward familiar adults are systematically reinforced on a daily basis using prompts, token reinforcers, and verbal praise for appropriate social behavior. As the number of social initiations by the adolescent toward adults increase, spontaneous and incidental initiating by the adults toward the adolescent also increase, thus providing a higher quality and quantity of social attention for the adolescent with autism.</i>

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CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR TRANSITIONING YOUTH		TABLE 4.9
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Modeling (2)	These interventions rely on an adult or peer providing a demonstration of the target behavior that should result in an imitation of the target behavior by the individual with an ASD	<i>An example of modeling as an intervention procedure for task completion in adolescents is shown by the efficacy of specific versus general instructions. Compliance with tasks such as reading short passages, answering questions, and typing lines of text is improved when instructions are modeled in a specific manner, e.g., "Here are some shapes; try to cut out at least five shapes in the next 15 minutes," versus a general instruction, e.g., "Here are some shapes, cut out as many as you can."</i>
Multi-component Package (1)	These interventions involve a combination of multiple treatment procedures that are derived from different fields of interest or different theoretical orientations. These treatments do not better fit one of the other treatment "packages" in this list nor are they associated with specific treatment programs	<i>The multi-component package combines selected procedures to achieve a unique outcome. For example, multi-component interventions were used to successfully eliminate drooling in a 17-year-old student with autism attending high school. The adolescent was taught new compensatory responses, e.g., wiping his mouth and swallowing saliva, and then received positive reinforcement for having a "dry mouth." The adolescent was also given opportunities to learn to monitor his appearance. This multi-component design was implemented across three different school locations to promote response generalization of the newly learned behavior.</i>
Music Therapy (1)	These interventions seek to teach individual skills or goals through music	<i>Music therapy has been used in schools and at home almost exclusively for younger children to promote socialization, communication, and academic skills. For example, skills such as counting, learning colors, taking turns, and gaining and maintaining attention are addressed by presenting songs and rhythmic cuing via different instruments. The goal is to eventually fade the music as the skill is acquired. In one published sample, parents reported "some" improvement using music therapy.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

(CONTINUED)

(CONTINUED)

CMS

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR TRANSITIONING YOUTH

TABLE 4.9

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Naturalistic Teaching Strategies (2)	<p>Interventions involving using primarily child-directed interactions to teach functional skills in the natural environment. They often focus on providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts</p>	<p><i>For adolescents, a good example of naturalistic teaching is building and maintaining social interactions. This approach is well suited for higher functioning individuals with ASDs and has been used to increase social engagement, more frequent social initiation, and emotional expression. Intervention takes place in the adolescent's natural environment and uses incidental teaching. Multiple typical peers model appropriate social behavior. Motivation to participate in structured social learning is found in the use of activities specific to the interests of the adolescent.</i></p>
Self-management (3)	<p>These interventions involve independence by teaching individuals with ASDs to regulate their behavior by recording the occurrence/non-occurrence of the target behavior, and securing reinforcement for doing so. Initial skills development may involve other strategies and may include the task of setting one's own goals</p>	<p><i>An example of self-management intervention is reducing repetitive behaviors, e.g., inappropriate vocalizations. Vocalizations include humming, squealing, whistling, and echoing the same word(s). Student is taught to identify the target behavior, self record occurrences of the behavior, and then self-reinforce following successful occurrence or nonoccurrence of the target behavior. Other examples of self-management include following a schedule and increasing play and social skills.</i></p>
Social Communication Intervention (1)	<p>These psychosocial interventions involved targeting some combination of impairments such as pragmatic communication skills, and the inability to successfully read social situations</p>	<p><i>Self-determination skills for adolescents offer a good example of social communication intervention. Self-determination requires knowledge of one's own strengths and personal goals and the skills needed to achieve those goals. Learning self-determination is achieved by using visual instructions, small group instruction, and video examples of social situations.</i></p>

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CMS

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR TRANSITIONING YOUTH

TABLE 4.9

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Structured Teaching (1)	This intervention involves a combination of procedures that rely on the physical organization of a setting, predictable schedules, and individualized use of teaching methods. These treatment programs may also be referred to as TEACCH	<i>A good example of one application of structured teaching is enhancing the quality of a residential living program. Adolescents and young adults who are given access to individualized programming, visual instructional systems, and other forms of increased structure in their daily living environment show improvements in behavior, greater independence, and their family's satisfaction.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2

Unestablished, Insufficient
Evidence, or Level 3

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR ADULTS

TABLE 4.10

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Antecedent Package (1)	Interventions involving the modifications of events that typically precede the occurrence of a target behavior. These alterations are made to increase the likelihood of success or reduce the likelihood of problems occurring	<i>One example that may be effective for increasing compliance in adults is the use of the behavioral momentum principle. In this example, a prompted request for a response that is highly likely to occur, i.e., a well-learned and preferred response, is immediately followed by a request for a response that is much less likely to occur. The "momentum" of several successful repetitions of the high probability response carries through the adult's behavior to ensure successful completion of the low probability targeted response. In principle, using this practice increases compliance following a request for a low probability response.</i>
Music Therapy (2)	These interventions seek to teach individual skills or goals through music.	<i>Music has been used to address behavioral, social, physical, sensory-motor, and cognitive abilities. The music therapist reinforces singing, listening, moving, playing instruments, and other activities in a prescribed manner to develop skills in the above areas. The most frequently used interventions for adults include singing, piano playing, and drumming. Musical skills including singing a short or long melody, playing the C scale on a keyboard, music absorption, rhythm reproduction, and execution of complex rhythmic patterns are also adult musical interventions.</i>

(CONTINUED)

CMS. LEVEL 3: UNESTABLISHED INTERVENTIONS FOR ADULTS		TABLE 4.10
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Naturalistic Teaching Strategies (1)	Interventions involving using primarily child-directed interactions to teach functional skills in the natural environment. They often focus on providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts.	<i>Although these teaching strategies are known to be effective for children, research has not yet tested the effectiveness of naturalistic teaching with adults. Some studies report that providing adult-selected activities and allowing personal preference in job training activities (for employment and independent living) increases interest in the task and overall motivation. Naturalistic teaching strategies for adults require individualized teaching procedures that reflect an adult learner's skills and preferences.</i>
Social Communication Intervention (SCI) (1)	These psychosocial interventions involved targeting some combination of impairments such as pragmatic communication skills, and the inability to successfully read social situations.	<i>For adults, social communication intervention is used mainly to develop and support self-determination skills. Self-determination strategies are intended to enhance self-directed decision making for adults with autism, i.e., becoming aware of strengths and personal challenges and being able to plan realistic goals and be successful socially. Among other things, SCI promotes broader and more complex use of language and vocabulary. Modeling, including video modeling, rehearsal, and feedback are typical practices in SCI.</i>
Social Skills Package (2)	These interventions seek to build social interaction skills in children with ASD by targeting basic responses (e.g., eye contact, name response) to complex social skills (e.g., how to initiate or maintain a conversation)	<i>Social skill interventions designed for adults are limited. Social skills training for adults has focused on understanding autism, recognizing and expressing emotion, and learning to read and express "body language." Other adult training topics are initiating contact and ending conversations, assertiveness, job interviewing, and managing stressful situations. Training techniques include role playing, video modeling, games, and team activities.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

OTHER RESULTS

Cost and Funding Issues.

- The costs associated with ASDs are significant.
- Four studies addressed the cost-benefit of early intensive behavioral interventions. Overall, these studies supported implementation of early intensive behavioral interventions in place of the status quo for children with ASDs. See the full report for a discussion of factors that may facilitate or impede the success of these programs.

Service Use, Availability, and Access for Individuals with ASDs.

ACCESS TO SERVICES:

- Children with ASDs receive a broad range of services.
- Clinicians are concerned about reimbursements for developmental screenings and assessments of children.
- There is great variation among professionals regarding the criteria for diagnosis, assessment, and care of infants and toddlers with ASDs.
- Care for individuals in racial and ethnic minority families may be limited.

ACCESS TO MEDICAL SERVICES:

- For some individuals, limited access to community-based health care services has led to poorer health outcomes.
- Many persons with developmental disabilities who do not receive health care through community-based services access services through Medicare and Medicaid programs.
- Finding providers with appropriate training is a problem for families seeking care for a person with an ASD.

LIMITATIONS OF THE REVIEW

- Only research published in English was included in the analysis.
- The research findings were presented by a classification system in which some of the interventions were packaged together for analysis.
- The research articles were limited to a 10-year period.

National Standards Report

DEVELOPED BY THE NATIONAL STANDARDS PROJECT (NSP)

CONTEXT

This review was sponsored by the National Autism Center (NAC), a nonprofit organization dedicated to serving children and adolescents with autism spectrum disorders (ASDs) by providing reliable information, promoting best practices, and offering comprehensive resources for families, practitioners, and communities. The *National Standards Report* was produced by the National Standards Project (NSP), one of several activities of NAC. (Since this report is frequently referred to by the acronym associated with its sponsor, in this document the report will also be referred to as the NSP). Advisors, expert panelists, document commentators, volunteers who reviewed research articles, and conceptual reviewers assisted NAC staff with the report's development.

The goal of the report is to help parents, educators, and other service providers make informed choices about educational and behavioral interventions for individuals with ASDs by providing information about which interventions have evidence of effectiveness.

The National Autism Center intended to improve on past treatment guidelines by being comprehensive and transparent.

Comprehensiveness

- Reviewed all research literature on educational and behavioral treatments for ASDs from 1957 to 2007
- Provided information based on age (below age 22 years), diagnostic groups, and treatment goals

Transparency

- Provided a detailed explanation of the review and decision-making process including feedback from parents, professionals, and experts from diverse disciplines

National Autism Center. (2009). *National standards report: The national standards project—*

Addressing the need for evidence-based practice guidelines for autism spectrum disorders.

Retrieved from <http://www.nationalautismcenter.org/pdf/NAC%20Standards%20Report.pdf>

OBJECTIVES OF THE RESEARCH

- Provide information on the strength of evidence supporting educational and behavioral interventions used with individuals below 22 years of age with ASDs
- Describe the age, diagnosis, and skill/behaviors targeted for improvement by the interventions
- Identify limitations of existing intervention research
- Help parents, caregivers, educators, and service providers understand how to integrate evidence-based research findings into decisions about intervention selection

SUMMARY

- Focus of report: educational and behavioral interventions
- Age range: below 22 years of age
- Number of studies reviewed: 775 studies were retained for final analysis based on the inclusion/exclusion criteria
- Dates of research studies: 1957-2007
- Classification system: classified interventions based on quantity, quality, and consistency of available research evidence as established, emerging, unestablished, or ineffective/harmful

METHODS

Article Selection. The NSP developed a process for evaluating research about interventions for ASDs based on best practice guidelines developed in other areas of health and psychology, and on input from research experts and experts from diverse fields related to ASD intervention.

The process included a comprehensive approach to find all relevant research followed by detailed review to determine if an article should be included or excluded.

Inclusion Criteria. Research on educational and behavioral interventions for individuals under age 22 years was included if it met the following criteria:

- The research was published in a peer-reviewed journal.
- The intervention targeted the individual with an ASD (e.g., not training parents or providers).
- The intervention could be implemented in or by school systems, or by early intervention, home, clinic, or community-based providers.

Exclusion Criteria. Research on educational and behavior interventions was excluded based on the following criteria:

- Research did not match the specific purpose of the project; for example, the project excluded articles about medical treatments or treatments for conditions that can occur in addition to ASDs.
- Research participants had co-morbid conditions that do not commonly co-occur with ASDs.
- Research articles did not include quantifiable data.
- Research participants were over the age of 22 years.

Scientific Merit Rating Scale. A detailed system was developed to rate each research study and careful steps were taken to ensure that professionals reviewing the articles accurately followed the rating system. Research studies were rated based on (a) the technical design of the study, (b) the quality of the data collected, (c) how consistently the intervention was implemented in the study, (d) the use of well-established diagnostic procedures to identify individuals with ASDs to include in the study, and (e) evidence that the benefit of the treatment extended over time, tasks, settings, and so on.

RESULTS

The experts involved in the NSP developed categories to group the interventions into intervention classes that in some cases resulted in “treatment packages.” Based on the quality, quantity, and consistency of the research results, interventions were classified as follows:

Established. There is enough evidence to determine that an intervention is effective.

Emerging. There is some preliminary evidence that an intervention may be beneficial, but more high quality studies are needed.

Unestablished. There is not enough evidence to determine if an intervention is effective, is not effective, or is harmful.

Ineffective/Harmful. There is enough evidence to determine that an intervention is not effective or is harmful.

Treatments also were classified based on whether the evidence shows benefit for

- specific age groups,
- specific diagnostic group, or
- increasing specific skills or decreasing specific behaviors.

KEY
Effective, Established, Evidence-based, or Level 1
Ineffective
Emerging, Marginal, or Level 2
Unestablished, Insufficient Evidence, or Level 3

ESTABLISHED INTERVENTIONS

The NSP identified 11 established interventions. These interventions are listed in Table 4.11. These results have been adapted with permission of the National Autism Center.

NSP. ESTABLISHED INTERVENTIONS		TABLE 4.11
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Antecedent Package (99)	Involves modification of situational events that precede a target behavior to increase likelihood of success or decrease likelihood of problem behavior	Behavior chain interruption, behavioral momentum, cueing and prompting, errorless compliance, habit reversal
Behavioral Package (231)	Basic principles of behavior change are used to reduce problem behaviors and teach alternative behaviors or skills; treatments included in this category often involve a complex combination of behavioral procedures	Behavioral packages for sleep or toilet training, differential reinforcement strategies, contingency mapping and/or contracting, task analysis, token economy
Comprehensive Behavioral Treatment for Young Children (22)	Comprehensive treatment programs for children under 8 years of age that involve a combination of ABA procedures, low student-to-teacher ratio, have treatment manuals, target core ASD symptoms, provide high intensity treatment and include measurement of program effectiveness	ABA programs, early intensive behavioral intervention (EIBI) programs
Joint Attention Intervention (6)	Building foundational skills involved in regulating the behaviors of others such as responding to nonverbal social bids or initiating joint attention	Teaching behaviors such as pointing to objects, showing items to another person, or following eye gaze

(CONTINUED)

(CONTINUED)

NSP

NSP. ESTABLISHED INTERVENTIONS

TABLE 4.11

KEY

Effective, Established, Evidence-based, or Level 1
Ineffective
Emerging, Marginal, or Level 2
Unestablished, Insufficient Evidence, or Level 3

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Modeling (50)	An adult or peer demonstrates a target behavior so that the target behavior is imitated by the individual with an ASD; often combined with prompting and reinforcement	Live modeling, video modeling
Naturalistic Teaching Strategies (32)	Use primarily child-directed interactions to teach functional skills in the natural environment; often involve providing a stimulating environment, modeling play skills, encouraging conversation, providing choices and direct/natural reinforcement, and rewarding reasonable attempts	Focused stimulation, incidental teaching, milieu teaching, embedded teaching, and responsive teaching and prelinguistic milieu teaching
Peer Training Package (33)	Teaching strategies to students without disabilities for facilitating play and social interaction with children with ASDs; treatments in this category included both initiation training and peer training and also may include components of other treatment packages (e.g., prompting and reinforcement)	Peer networks, circle of friends, buddy skills package, Integrated Play Groups™, peer initiation training and peer-mediated social interactions
Pivotal Response Treatment (PRT) (14)	Targets pivotal behavior areas such as motivation for social communication, self-initiation, and self-management with the goal of widespread and fluently integrated collateral improvements; key components include parent involvement in delivery and intervening in natural settings	Natural Language Paradigm
Schedules (12)	Presentation of a task list that communicates a series of activities or steps required to complete a specific activity; often supplemented by other interventions such as reinforcement	Schedules can take several forms including written words, pictures, photographs or work stations
Self-management (21)	Teaching individuals with ASDs to regulate their behavior by recording the occurrence/non-occurrence of the target behavior and independently seeking or delivering reinforcement for doing so; initial skill development may involve other strategies and may include setting one's own goals	Use of checklists, wrist counters, visual prompts and tokens
Story-based Intervention Package (21)	Involves a written description of the situation under which specific behaviors are expected to occur; may be supplemented with additional components such as prompting, reinforcement, discussion, etc.	Social Stories™ are the most well-known story-based intervention

NOTE: Adapted with permission from "National Standards Report: The National Standards Project—Addressing the Need for Evidence-based Practice Guidelines for Autism Spectrum Disorders," 2009, National Autism Center, Randolph, MA.

All of the interventions listed in Table 4.11 are established interventions; there is sufficient evidence to state that these interventions are effective for some individuals with ASDs. However, there are some individuals who do not respond to an intervention that is shown to be effective. Similarly, some interventions may be effective for one symptom and not for another. Tables 4.11a-d were developed by the NSP to identify subgroups that might be responsive to specific interventions and to make the process of selecting from the 11 established interventions easier. These tables are adapted with permission of the National Autism Center.

NSP. ESTABLISHED INTERVENTIONS WITH FAVORABLE OUTCOMES

TABLE 4.11A

Skills Increased

	ACADEMIC	COMMUNICATION	HIGHER COGNITIVE FUNCTIONS	INTERPERSONAL	LEARNING READINESS	MOTOR	PERSONAL RESPONSIBILITY	PLACEMENT	PLAY	SELF-REGULATION
Antecedent Package	■			■	■		■		■	■
Behavioral Package	■	■		■	■		■		■	■
Comprehensive Behavioral Treatment for Young Children	■		■	■		■	■	■		
Joint Attention Intervention	■			■						
Modeling	■	■	■				■		■	
Naturalistic Teaching Strategies	■			■	■				■	
Peer Training Package	■			■					■	
Pivotal Response Treatment	■			■					■	
Schedules										■
Self-management				■						■
Story-based Intervention Package for Young Children				■						■

NSP. ESTABLISHED INTERVENTIONS WITH FAVORABLE OUTCOMES

TABLE 4.11B

Behaviors Decreased

	PROBLEM BEHAVIORS	RESTRICTED, REPEITIVE NONFUNCTIONAL BEHAVIOR, INTERESTS, OR ACTIVITIES	SENSORY/EMOTIONAL REGULATION	GENERAL SYMPTOMS
Antecedent Package	■		■	
Behavioral Package	■	■	■	
Comprehensive Behavioral Treatment for Young Children	■			■
Modeling	■		■	
Peer Training Package		■		
Self-management	■			

NSP. ESTABLISHED INTERVENTIONS WITH FAVORABLE OUTCOMES

TABLE 4.11C

Ages

	0-2	3-5	6-9	10-14	15-18	19-21
Antecedent Package		■	■	■	■	
Behavioral Package	■	■	■	■	■	■
Comprehensive Behavioral Treatment for Young Children	■	■	■			
Joint Attention Intervention	■	■				
Modeling		■	■	■	■	
Naturalistic Teaching Strategies	■	■	■			
Peer Training Package		■	■	■		
Pivotal Response Treatment		■	■			
Schedules		■	■	■		
Self-management		■	■	■		■
Story-based Intervention Package for Young Children			■	■		

NSP. ESTABLISHED INTERVENTIONS WITH FAVORABLE OUTCOMES

TABLE 4.11D

Diagnostic Classification			
	AUTISTIC DISORDER	ASPERGER'S SYNDROME	PDD-NOS
Antecedent Package	■		
Behavioral Package	■		■
Comprehensive Behavioral Treatment for Young Children	■		■
Joint Attention Intervention	■		■
Modeling	■	■	■
Naturalistic Teaching Strategies	■		■
Peer Training Package	■		■
Pivotal Response Treatment	■		
Schedules	■		
Self-management	■		
Story-based Intervention Package for Young Children	■	■	

NOTE: Adapted with permission from "National Standards Report: The National Standards Project—Addressing the Need for Evidence-based Practice Guidelines for Autism Spectrum Disorders," 2009, National Autism Center, Randolph, MA.

EMERGING INTERVENTIONS

The NSP identified 22 emerging interventions. The term “emerging” is used by the NSP to describe an intervention for which there is some preliminary evidence that the intervention may be beneficial, but more high quality studies are needed.

A complete listing of interventions classified as emerging, including a brief description of each of these interventions and illustrative examples, is contained in Table 4.12. Although the first two columns of this table are adapted with permission of the National Autism Center, italicized text in the third column (examples) has been added by staff of the Missouri Autism Guidelines Initiative to assist the reader in understanding the type of intervention under discussion. The examples were taken from the published research articles that the NSP used to investigate that procedure. In some instances, examples of how the procedures could be applied were taken from other publications that review the use of evidence-based practices, e.g., text books or training manuals. The limited examples cited for each intervention approach are provided for educational purposes only and should not be interpreted as the only way to apply a given procedure. Most interventions have multiple applications depending on the age and learning ability of the person being treated and the resources available for implementing the procedure.

NSP. EMERGING INTERVENTIONS			TABLE 4.12
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Augmentative and Alternative Communication Device (14)	These interventions involved the use of high or low technologically sophisticated devices to facilitate communication.	Examples include but are not restricted to: pictures, photographs, symbols, communication books, computers, or other electronic devices.	
Cognitive Behavioral Intervention Package (3)	These interventions focus on changing everyday negative or unrealistic thought patterns and behaviors with the aim of positively influencing emotions and/or life functioning.	<i>Uses strategies and techniques from both cognitive and behavioral research to develop treatment programs for higher functioning persons with ASDs. Ways of self-monitoring and self-regulating are taught to increase self-control and direction while reducing anxiety. Modeling, social scripts and verbal feedback in real life situations are used to improve control of self.</i>	

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NSP

NSP. EMERGING INTERVENTIONS		TABLE 4.12
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Developmental Relationship-based Treatment (7)	These treatments involve a combination of procedures that are based on developmental theory and emphasize the importance of building social relationships. These treatments may be delivered in a variety of settings (e.g., home, classroom, community). All of the studies falling into this category met the strict criteria of: (a) targeting the defining symptoms of ASD, (b) having treatment manuals, (c) providing treatment with a high degree of intensity, and (d) measuring the overall effectiveness of the program.	These treatment programs may also be referred to as the Denver Model, DIR (Developmental, Individual Differences, Relationship-based)/Floortime, Relationship Developmental Intervention, or Responsive Teaching.
Exercise (4)	These interventions involve an increase in physical exertion as a means of reducing problem behaviors or increasing appropriate behavior.	<i>Exercise is used as an adjunct to traditional behavioral interventions. It can produce weight loss, increased attention, and increases in fitness levels indicated by changes in balance, speed, agility, strength, flexibility, and endurance. Activities include the treadmill, swimming, and jogging. Exercise has been used to decrease inappropriate behaviors such as rocking, spinning, head-nodding, hand flapping, object-tapping and some aggressive and self-injurious behaviors.</i>
Exposure Package (4)	These interventions required that the individual with ASD increasingly face anxiety-provoking situations while preventing the use of maladaptive strategies used in the past under these conditions.	<i>Examples of graduated exposure to anxiety provoking situations or to stimuli that produce hypersensitive responses include teaching typical responding to the presence of lights, touch, dental procedures, sounds, smells, and taste. Introduction and acceptance of lesser preferred foods is one example of the use of an exposure package.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

CHAPTER 4

(CONTINUED)

(CONTINUED)

NSP

NSP. EMERGING INTERVENTIONS

TABLE 4.12

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Imitation-based instruction (6)	These interventions rely on adults imitating the actions of a child.	<i>An example of imitation-based instruction is reciprocal interaction training (RIT) which is child directed and occurs in natural learning environments. Imitation skills are instrumental and descriptive gestures and joint attention (pointing & showing). Imitation skills are taught during play activities along with opportunities to generalize the imitation to play partners.</i>
Initiation Training (7)	These interventions involve directly teaching individuals with ASD to initiate interactions with their peers.	<i>Examples of initiation training include making eye contact, approaching, greeting and exchanging responses with a peer. Initiated responses can be for conversation, play, or other forms of brief social engagement.</i>
Language Training (Production) (13)	These interventions have as their primary goal to increase speech production.	Examples include but are not restricted to: echo relevant word training, oral communication training, oral verbal communication training, structured discourse, simultaneous communication, and individualized language remediation.
Language Training (Production and Understanding) (7)	These interventions have as their primary goals to increase both speech production and understanding of communicative acts.	Examples include but are not restricted to: total communication training, position object training, position self-training, and language programming strategies.
Massage/Touch Therapy (2)	These interventions involve the provision of deep tissue stimulation.	<i>Massage therapy has been applied to children to reduce touch aversion, repetitive behaviors, sleep disturbance and hyperactivity and stimulate on-task behavior and social connectivity.</i>
Multi-component Package (10)	These interventions involve a combination of multiple treatment procedures that are derived from different fields of interest or different theoretical orientations. These treatments do not better fit one of the other treatment “packages” in this list nor are they associated with specific treatment programs.	<i>This category of intervention studies combines several different intervention procedures to address a variety of treatment issues including: caregiver-based intervention, ruminative vomiting, cognitive training with elevated boards and sign language, teaching nonverbal children useful speech, and parental bonding.</i>

(CONTINUED)

(CONTINUED)

NSP

NSP. EMERGING INTERVENTIONS			TABLE 4.12
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Music Therapy (6)	These interventions seek to teach individual skills or goals through music.	A targeted skill (e.g., counting, learning colors, taking turns, etc.) is first presented through song or rhythmic cueing and music is eventually faded.	
Peer-mediated Instructional Arrangement (11)	These interventions involve targeting academic skills by involving same-aged peers in the learning process.	This approach is also described as peer tutoring.	
Picture Exchange Communication System (PECS) (13)	This treatment involves the application of a specific augmentative and alternative communication system based on behavioral principles that are designed to teach functional communication to children with limited verbal and/or communication skills.	<i>Initiating more communications and increased interaction with peers are expected outcomes with PECS. PECS teaches initiation of social communication starting with requesting, then discrimination of desired objects, and progresses to spontaneous commenting. Can be used to reduce behavioral problems where functional communication is absent.</i>	
Reductive Package (33)	These interventions rely on strategies designed to reduce problem behaviors in the absence of increasing alternative appropriate behaviors.	Examples include but are not restricted to water mist, behavior chain interruption (without attempting to increase an appropriate behavior), protective equipment, and ammonia.	
Scripting (6)	These interventions involve developing a verbal and/or written script about a specific skill or situation which serves as a model for the child with ASD. Scripts are usually practiced repeatedly before the skill is used in the actual situation.	<i>Examples of teaching children with autism using scripts include targeting elements of conversational speech, prompting engagement in conversational exchanges, and initiating socially to peers.</i>	

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

CHAPTER 4

(CONTINUED)

(CONTINUED)

NSP

NSP. EMERGING INTERVENTIONS

TABLE 4.12

INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Sign Instruction (11)	These interventions involve the direct teaching of sign language as a means of communicating with other individuals in the environment.	<i>Children with autism that remain mute are trained using American Sign Language or a modified version of it to learn functional expressive communication skills. Skills include learning to sign simple gestures to get something desired, signing to avoid frustration and other negative emotions, and associating meaning with gestures as a foundation for successful contact with peers.</i>
Social Communication Intervention (5)	These psychosocial interventions involve targeting some combination of social communication impairments such as pragmatic communication skills, and the inability to successfully read social situations. These treatments may also be referred to as social pragmatic interventions.	<i>Social communication interventions use multiple behavioral techniques to enable an individual with autism to know how to appropriately approach and successfully communicate with another person. They focus on increasing understanding of another person's social and verbal behavior well enough to share meaningful thoughts, avoid interrupting, and maintain appropriate distance while communicating. Examples of goals of this intervention are to learn how to identify and respond appropriately to other's emotions, regulate speech content while interacting, and use body gestures and facial expression to communicate, compliment, etc. These skills can be taught in structured group social settings.</i>
Social Skills Package (16)	These interventions seek to build social interaction skills in children with ASD by targeting basic responses (e.g., eye contact, name response) to complex social skills (e.g., how to initiate or maintain a conversation).	<i>This practice typically uses structured group settings in which behavioral techniques, e.g., video modeling, peer modeling, theory of mind constructs, are used to teach initiation of social contact. Emphasis is on creating highly structured opportunities to engage in social behavior with peers and generalizing those behaviors to other settings, e.g., community and school settings.</i>

(CONTINUED)

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NSP

CHAPTER 4

NSP. EMERGING INTERVENTIONS		TABLE 4.12
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Structured Teaching (4)	Based on neuropsychological characteristics of individuals with autism, this intervention involves a combination of procedures that rely heavily on the physical organization of a setting, predictable schedules, and individualized use of teaching methods. These procedures assume that modifications in the environment, materials, and presentation of information can make thinking, learning, and understanding easier for people with ASD if they are adapted to individual learning styles of autism, and individual learning characteristics. All of the studies falling into this category met the strict criteria of: {a} targeting the defining symptoms of ASD; {b} having treatment manuals; {c} providing treatment with a high degree of intensity; and {d} measuring the overall effectiveness of the program.	These intervention programs may also be referred to as TEACCH.
Technology-based Treatment (19)	These interventions require the presentation of instructional materials using the medium of computers or related technologies. The theories behind technology-based treatments may vary but they are unique in their use of technology.	Examples include but are not restricted to Alpha Program, Delta Messages, the Emotion Trainer Computer Program, pager, robot, or a PDA (Personal Digital Assistant).
Theory of Mind Training (4)	These interventions are designed to teach individuals with ASDs to recognize and identify mental states (i.e., a person's thoughts, beliefs, intentions, desires and emotions) in oneself or in others and to be able to take the perspective of another person in order to predict their actions.	<i>Attempts have been made using theory of mind training to increase conversational skills, improve the ability to more accurately interpret perceptions during contact with others, and predict and explain the behaviors of others.</i>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Adapted with permission from "National Standards Report: The National Standards Project—Addressing the Need for Evidence-based Practice Guidelines for Autism Spectrum Disorders," 2009, National Autism Center, Randolph, MA.

UNESTABLISHED INTERVENTIONS

The term unestablished is used by NSP to describe interventions for which there is little or no evidence in the scientific literature from which to draw conclusions about their effectiveness with individuals with ASDs. There is no way to rule out the possibility that these interventions are either ineffective or harmful. Although the first two columns of this table are adapted with permission of the National Autism Center, italicized text in the third column (examples) has been added by staff of the Missouri Autism Guidelines Initiative to assist the reader in understanding the type of intervention under discussion.

NSP. UNESTABLISHED INTERVENTIONS			TABLE 4.13
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES	
Academic Interventions (10)	These interventions involve the use of traditional teaching methods to improve academic performance.	Examples include picture-to-text matching, answering pre-reading questions, sentence combining, and handwriting training.	
Auditory Integration Training (3)	This intervention involves the presentation of modulated sounds through headphones in an attempt to retrain an individual's auditory system with the goal of improving distortions in hearing or sensitivities to sound.	<i>Proponents of this training purport that it improves the ability to process sound and therefore leads to improved ability to attend, communicate, and stay engaged during social contact.</i>	

(CONTINUED)

NSP. UNESTABLISHED INTERVENTIONS		TABLE 4.13
INTERVENTION (Number of Studies Reviewed)	BRIEF DESCRIPTION	EXAMPLES
Facilitated Communication (FC) (5)	<p>This intervention involves having a facilitator support the hand or arm of an individual with limited communication skills, helping the individual express words, sentences, or complete thoughts by using a keyboard of words or pictures or typing device.</p> <p>The National Standards Project followed strict inclusionary/exclusionary criteria. As a result, a large number of studies on facilitated communication that (a) involved adults 22 years of age or older, (b) involved individuals with infrequently occurring co-morbid conditions, and (c) focused on the adult facilitators (as opposed to the individuals with ASDs) were eliminated. Although the results indicate facilitated communication is an “Unestablished Intervention,” a number of professional organizations have adopted resolutions advising against its use (e.g., American Psychological Association, 1994).</p>	<p><i>Proponents of facilitated communication report that FC increases the ability to communicate and can in some cases lead to learning to type on a keyboard.</i></p>
Gluten- and Casein-Free Diet (2)	<p>These interventions involve elimination of an individual’s intake of naturally occurring proteins gluten and casein. Early studies suggested that the Gluten- and Casein-Free diet may produce favorable outcomes but did not have strong scientific designs. Better controlled research published since 2006 suggests there may be no educational or behavioral benefits for these diets. Further, potential medically harmful effects have begun to be reported in the literature.</p>	<p><i>Proponents of gluten- and casein-free diets believe that a diet free of gluten and casein leads to improvements in language development and social relatedness. Families report that their children have experienced less constipation and diarrhea after starting this type of diet.</i></p>
Sensory Integrative Package (7)	<p>These treatments involve establishing an environment that stimulates or challenges the individual to effectively use all of their senses as a means of addressing overstimulation or understimulation from the environment.</p>	<p><i>Reported outcomes for sensory integration-based interventions are improved attention (awareness), behavioral control, and reduced arousal and anxiety.</i></p>

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2

Unestablished, Insufficient
Evidence, or Level 3

NOTE: *Italicized type indicates examples that have been added to assist the reader in understanding the findings.*

Adapted with permission from “National Standards Report: The National Standards Project—Addressing the Need for Evidence-based Practice Guidelines for Autism Spectrum Disorders,” 2009, National Autism Center, Randolph, MA.

INEFFECTIVE/HARMFUL INTERVENTIONS

The NSP describes ineffective or harmful interventions as those for which several well-controlled studies have shown the intervention to be ineffective or to produce harmful outcomes. There are no interventions that meet these criteria.

LIMITATIONS OF THE REVIEW

- The research focused only on individuals from birth to age 22.
- The research findings were presented by a classification system in which some interventions were packaged together for analysis.
- While the research included group and single-subject designs, it did not include every type of research study.
- No training was offered to reviewers before they began rating the articles.
- Only research published in English was included in the analysis.
- The research articles included only literature published prior to the fall of 2007.

Therapies for Children with Autism Spectrum Disorders

PREPARED BY VANDERBILT EVIDENCE-BASED PRACTICE CENTER FOR THE AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)

CONTEXT

The Agency for Healthcare Research and Quality (AHRQ) is the nation's lead federal agency for research on healthcare quality, costs, outcomes, and patient safety. It is the health services research arm of the U.S. Department of Health and Human Services (HHS), complementing the biomedical research mission of its sister agency, the National Institutes of Health (NIH).

The mission of AHRQ is to organize and make available knowledge to inform decisions about health care. As part of the 2003 Medicare Prescription Drug, Improvement, and Modernization Act, Congress directed AHRQ to research the clinical effectiveness of healthcare services.

Vanderbilt Evidence-based Practice Center is one of 14 Evidence-based Practice Centers in the U.S. funded by the Agency for Healthcare Research and Quality (AHRQ) to increase the use of evidence-based practice in standard medical care. The Practice Centers undertake systematic reviews of currently available evidence concerning various topics in medicine, social and behavioral science, and economics.

Warren, Z., Veenstra-VanderWeele, J., Stone, W., Bruzek, J. L., Nahmias, A. S., Foss-Feig, J. H.,... McPheeeters, M. (2011). *Therapies for children with autism spectrum disorders. Comparative Effectiveness Review Number 26*. AHRQ Publication No. 11-EHC029-EF. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from http://www.effectivehealthcare.ahrq.gov/ehc/products/106/656/CER26_Autism_Report_04-14-2011.pdf

OBJECTIVES OF THE RESEARCH

- Help healthcare decision-makers—patients and clinicians, health system leaders, and policymakers, among others—make well-informed decisions and thereby improve the quality of healthcare services
- Provide a medical reference to be used in the context of other relevant information, such as individual patient characteristics and resources available in a specific community, and not intended as a substitute for clinical judgment
- Review evidence on treatment outcomes, modifiers of treatment effectiveness, characteristics that might predict outcome, evidence for generalization of outcomes to other contexts, and evidence to support treatment decisions in children ages 0 to 2 years at risk for an ASD diagnosis and children 2 to 12 years with ASDs

SUMMARY

- Report focus: behavioral, educational, medical, allied health, and complementary and alternative medicine (CAM) interventions
- Age range: children 2 to 12 years with ASDs; children 0 to 2 years at-risk for ASDs
- Number of studies reviewed: 159 studies met inclusion criteria
- Dates of research studies: January 2000 to May 2010
- Classification system: provides a qualitative summary of research findings; studies rated based on quality as good, fair, or poor; strength of evidence rated as high, moderate, low, or insufficient

METHODS

Input From Stakeholders. Public input influenced the selection of autism therapies as a topic for review as well as drafting of the key questions to be addressed by the report. A Technical Expert Panel was convened to provide input on issues such as criteria for including or excluding studies or assessing the quality of studies. A draft of the report was peer reviewed and available for public comment.

Key Questions. Research was reviewed to answer a set of seven key questions related to

1. short-term and long-term effects of interventions,
2. variables (e.g., frequency or duration) that influence intervention effectiveness,
3. early changes that predict outcomes,
4. changes measured at the end of intervention generalizing to long-term outcomes,
5. changes measured in the intervention context generalizing to other contexts,
6. specific components that drive intervention outcomes, and
7. use of specific interventions for children 0 to 2 years of age who are at-risk for ASDs.

Data Sources and Selection. A comprehensive search process was used to find relevant research articles published between January 2000 and May 2010. January 2000 was selected as a starting point to reflect the time frame in which the most recent diagnostic criteria for ASDs were revised and when high quality standardized diagnostic tools became available. Articles were independently read by two reviewers to determine if they would be included; disagreements were resolved by a third-party review.

Inclusion Criteria. Articles were included in the review if they met the following criteria established by the review team with the guidance of an expert panel:

- Article was published in English.
- Research provided information pertinent to the key questions.
- Article presented original research.
- Study involved an adequate number of participants.

Exclusion Criteria. Articles were excluded based on the following criteria:

- Article did not present aggregate results (i.e., only presented data for each individual participant) or presented graphical data only.
- Study had fewer than 10 total participants for studies of behavioral, educational, allied health, or CAM interventions or fewer than 30 total participants for medical studies. (*Note: Single-subject design studies were not excluded on the basis of their design; however, most are not represented in the review as they did not include at least 10 participants.*)
- Research included only individual case reports.

Data Extraction and Quality Assessment. Information from the articles was recorded and checked for accuracy by multiple team members. Data were extracted about treatment effectiveness as well as any harms or adverse effects. Multiple reviewers assessed the quality of research articles based on factors such as study design, diagnostic approach, participant ascertainment, intervention characteristics, outcomes measurement, and statistical analysis. Studies were rated as good, fair, or poor quality.

Data Synthesis and Analysis. Summary tables were used to synthesize studies that included comparison groups, and results were qualitatively summarized.

Strength of Evidence. The degree of confidence that an intervention produces lasting changes was rated in terms of evidence as insufficient, low, moderate, or high. Determinations about strength of evidence were based on adequacy of the current research in terms of quality, quantity, consistency, and precision. *Complete details of the process for evaluating strength of evidence can be found in Chapter 2 of the full AHRQ report.*

RESULTS

Evidence of effectiveness. Overall, only one behavioral intervention and two medical interventions were found to have evidence of effectiveness (Key Question 1).

- **BEHAVIORAL INTERVENTIONS.** Early intensive behavioral and developmental interventions, such as the UCLA/Lovaas Model or Early Start Denver Model (ESDM), improve cognitive, language, and adaptive outcomes in certain subgroups of children; however, the strength of evidence is low and more research is needed.
- **MEDICAL INTERVENTIONS.** A high level of evidence indicates that aripiprazole and risperidone reduce challenging and repetitive behaviors when compared with placebo; however, evidence also indicates a high risk of harms including weight gain, sedation, and extrapyramidal effects.

Evidence of ineffectiveness. One medical intervention, secretin, was identified as ineffective. Evidence indicates that secretin does not result in improvements in core ASD or other associated symptoms.

Insufficient evidence. The evidence is insufficient to determine the effectiveness, benefits, or adverse events from any other behavioral, medical, educational, or allied health or complementary and alternative medicine interventions.

AHRQ reviewed the research on ASD interventions in five categories – behavioral, educational, medical, allied health, and complementary and alternative medicine (CAM) interventions; this table provides information about the two medical interventions and one behavioral intervention that were found to have evidence of effectiveness.

MEDICAL

Antipsychotic Medications

Aripiprazole	Strength of Evidence of Effectiveness: HIGH <ul style="list-style-type: none"> ▪ Caregiver reports indicate reductions in problem behaviors such as emotional distress, aggression and self-injury. ▪ Improvements in repetitive behaviors also reported. <p>FDA approved for treatment of irritability in children (6 to 17 years) with Autistic Disorder.</p>	Risk of Adverse Effects: HIGH <p>Side effects can include weight gain, drowsiness (which may lessen over time), possible extrapyramidal symptoms (tremor, dyskinesia and muscle rigidity), and increased prolactin levels without associated clinical impact. No worsening in cognitive functioning.</p>
Risperidone	Strength of Evidence of Effectiveness: MODERATE <ul style="list-style-type: none"> ▪ Caregiver reports indicate reductions in problem behaviors such as irritability, hyperactivity, tantrums, crying, abrupt changes in mood, emotional distress, aggression and self-injury. ▪ Improvements in repetitive behaviors also reported. <p>FDA approved for treatment of irritability in children with ASDs.</p>	Risk of Adverse Effects: HIGH <p>Side effects can include weight gain, drowsiness (which may lessen over time), possible extrapyramidal symptoms (tremor, dyskinesia and muscle rigidity), and increased prolactin levels without associated clinical impact. No worsening in cognitive functioning.</p>

BEHAVIORAL

Early Intensive Behavioral and Developmental Intervention Approaches	<p>Examples include UCLA/Lovaas-based interventions and Early Start Denver Model (ESDM)</p> <p>The Lovaas model is a high-intensity manualized intervention based on principles of Applied Behavior Analysis and the work of Ivar Lovaas; Lovaas-based models often rely heavily on one-on-one sessions in which a trained provider uses discrete trial teaching to practice target skills.</p> <p>ESMD is a high-intensity manualized intervention which blends Applied Behavior Analysis (ABA) techniques with developmental and relationship-based approaches for young children.</p>	Strength of Evidence of Effectiveness: LOW <p>The combined research on Lovaas & ESDM suggests a benefit for some children and should continue to be studied. Areas of reported improvement include cognitive performance, language skills, adaptive behavior, and challenging behaviors. No evidence of adverse events.</p>
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AHRQ. INEFFECTIVE INTERVENTIONS

TABLE 4.15

AHRQ found sufficient evidence to conclude that the following intervention is not effective.

MEDICAL**Secretin**

Evidence indicates that secretin does not result in improvements in core ASD or other associated symptoms.

KEY

**Effective, Established,
Evidence-based, or Level 1**

Ineffective

**Emerging, Marginal, or
Level 2**

**Unestablished, Insufficient
Evidence, or Level 3**

AHRQ. INTERVENTIONS WITH INSUFFICIENT EVIDENCE

TABLE 4.16

The following interventions were found to have insufficient evidence of effectiveness or harms. This does not mean that these interventions are not associated with benefits or harms, but that further study is required. While all of the following interventions were described as having insufficient evidence by the AHRQ, the research that is available about these interventions varies significantly; for some, research suggests potential effectiveness, while for others, there are only poorly conducted research studies or little or no research. Additional comments from the AHRQ report are provided to aid in further clarifying the status of research on each intervention.

MEDICAL**Antipsychotics****Haloperidol + cyproheptadine**

One 8-week study suggests possible reduction in challenging and repetitive behaviors; further research is needed.

Serotonin Reuptake Inhibitors (SRIs)**Various SRIs**

Some evidence of benefit; more study needed.

Fluoxetine

One study suggests reduced repetitive behaviors and found that high doses may result in increased agitation; more study of benefit and adverse effects needed.

Citalopram/escitalopram

Some research suggests reduction in irritability with no change in repetitive behaviors. Adverse effects may include activation symptoms, diarrhea, and dry or itchy skin. More study of benefit and adverse effects needed.

Stimulants and Other Medications for Hyperactivity**Methylphenidate and other stimulants**

Shows promise for hyperactivity and other symptoms along with possible adverse effects including increased challenging behavior and loss of appetite; more research is needed.

Atomoxetine

Poor quality research; more study needed.

Guanfacine

Possible benefit for treating hyperactivity, inattention, insomnia and tics; more study needed.

(CONTINUED)

(CONTINUED)

AHRQ

AHRQ. INTERVENTIONS WITH INSUFFICIENT EVIDENCE

TABLE 4.16

Other Medical Interventions	
Management of sleep issues	
Melatonin	Shows promise; more research is needed.
Iron supplementation	
Management of gastrointestinal (GI) symptoms	
Oral immunoglobulin	No benefit shown to date.
Dietary supplements and restrictive diets for core symptoms of ASDs	
Magnesium-vitamin B6	Poor quality research; more study needed with comparison groups.
Amino acid-related compounds (e.g., L-carnosine and dimethylglycine)	Poor quality research; more study needed with comparison groups. Some early promise for L-carnosine
Agents with polyunsaturated fatty acids (PUFAs) – fish oil and evening primrose supplements	Omega-3 fatty acids show promise; more research is needed.
Other	
Amantadine	No evidence of benefit.
Piracetam	Early promise; more research needed.
Hyperbaric therapy	More research needed.
Cholinesterase inhibitors Donepezil hydrochloride Rivastigmine tartrate	No improvement in language or behavior found to date.
Dimercaptosuccinic acid (DMSA)-chelating agent	No evidence of benefit.
Pentoxifylline	One study suggested benefit when combined with risperdal; more research needed.
ALLIED HEALTH	
Speech and Language	
Responsive Education and Prelinguistic Milieu Training (RPMT)	Short-term improvement in word acquisition. May be most beneficial for children who are low in initial object exploration. Further study needed.
Picture Exchange Communication System (PECS)	Short-term improvement in word acquisition. May be most beneficial for children who are high in initial object exploration. Further study needed.

(CONTINUED)

(CONTINUED)

AHRQ

AHRQ. INTERVENTIONS WITH INSUFFICIENT EVIDENCE		TABLE 4.16
Sensory/Auditory		
Sensory integration	Poor quality studies limit conclusions.	
Auditory integration	Two fair quality studies showed no improvements in receptive or expressive language, cognitive skills, problems behaviors, adaptive behavior.	
Music therapy	All studies of poor quality; insufficient evidence to determine social skills outcomes.	
Additional Interventions		
Animal-assisted interventions	Inadequate research available.	
Prism lenses	Inadequate research available.	
Movement therapy	Inadequate research available.	
Systematic feeding training	Inadequate research available.	
COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS		
Massage	Short-term small studies based on parent report suggest possible benefit; however, evidence is insufficient to assess outcomes.	
Acupuncture	Evidence is insufficient. Adverse effects not yet addressed.	
BEHAVIORAL		
Behavioral Approaches Aimed at Core Symptoms		
Parent training approaches	Some evidence supports parent-based social communication interventions and Pivotal Response Training for parents; better quality research is needed.	
Social skills training	All studies show improvement in at least one outcome, but higher quality studies are needed.	
Joint attention intervention	Some evidence that joint attention interventions promoted expressive language growth. No studies reported harms from interventions.	
Symbolic play and play-based interventions	Parent training in play-based intervention showed some promise for reducing challenging behaviors and encouraging early social communication skills. Some evidence that symbolic play also promoted expressive language growth. No studies reported harms from interventions.	
Behavioral Approaches Aimed at Associated Symptoms		
Cognitive Behavioral Therapy (CBT)	Consistent positive findings of improvement in anxiety, anger, and challenging behavior levels are offset by variation among interventions and outcomes assessed. Further replication needed.	

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2Unestablished, Insufficient
Evidence, or Level 3

(CONTINUED)

AHRQ

AHRQ. INTERVENTIONS WITH INSUFFICIENT EVIDENCE

TABLE 4.16

Additional Behavioral Approaches	
Neurofeedback	Few studies all of poor quality result in insufficient evidence.
Sleep interventions	Few studies all of poor quality result in insufficient evidence.
EDUCATIONAL	
TEACCH	Most research was conducted prior to the cut-off date for the AHRQ review. Newer studies continue to report improvements in motor, eye-hand coordination, and cognitive measures. More studies measuring consistent outcomes needed.
Broad-based approaches	Too few studies with inconsistency in outcomes measured.
Computer-based approaches	Too few studies with inconsistency in outcomes measured.

LIMITATIONS OF THE REVIEW

- Only research published between 2000 and May 2010 was reviewed.
- The review focused on children ages 2 to 12 years with ASDs and children 0 to 2 years at-risk for ASDs.
- Conclusions of the review were limited by the quality of available research.

Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments (StART)

CONTEXT

Large numbers of children with ASDs are managed medically and receive both pharmacologic treatments and complementary and alternative treatments. This systematic review of the options for medical management of persons with autism spectrum disorders was conducted for Autism Spectrum Disorders: Best Practice Guidelines for Effective Interventions, which is under development by the Napa County Office of Education for the California Department of Developmental Services. Lynne Huffman, MD, Associate Professor (Research) in the Department of Pediatrics, Stanford University School of Medicine, heads the Stanford Autism Research Team (StART) that conducted the review.

Unlike other systematic reviews that emphasize general effects of medications, this review focuses on the effectiveness of treatments in addressing specific ASD core symptoms and associated behavior problems.

In this research, pharmacological interventions are defined as medications that are regulated by the U.S. Food and Drug Administration. Complementary and alternative medicine (CAM) is described as “non-prescribed therapies, including, but not limited to botanicals, vitamins, minerals, other ‘natural products’, mind-body medicine, and manipulative practices” (Huffman et al., 2011, p. 56). Some of the most common CAM approaches to ASD treatment involve modified diets and nutritional supplements.

Huffman, L. C., Sutcliffe, T. K., Tanner, I. S. D., & Feldman, H. M. (2011). Management of symptoms in children with autism spectrum disorders: A comprehensive review of pharmacologic and complementary-alternative medicine treatments. *Journal of Developmental and Behavioral Pediatrics, 32*, 56-68. Available from www.jdbp.org

OBJECTIVES OF THE RESEARCH

- Summarize current pharmacological and CAM treatment practices
- Inform and educate families and clinicians who provide treatment and support to children with ASDs about the evidence for medication treatments and CAM interventions

SUMMARY

- Focus of research: pharmacologic and complementary-alternative medicine (CAM) treatments organized by ASD symptoms, differentiating core and associated symptoms
- Age range: 0-22 years
- Number of studies reviewed: 115 articles met inclusion criteria
- Dates of research studies: 1994 to May 2007

METHODS

Inclusion Criteria. The researchers included studies that met the following criteria:

- Articles were published between January 1994 and May 2007.
- Articles were published in English.
- Research focused on individuals with ASDs under the age of 22 years.
- Interventions targeted the treatment of individuals with ASDs.
- Studies utilized single-subject designs or group designs of sufficient quality to be published in peer-reviewed journals.
- Studies included at least one standardized treatment outcome measure addressing ASD core features, behavior, and/or quality of life.

Exclusion Criteria. The researchers excluded studies based on the following criteria:

- Research used sample sizes less than 10, nonhuman subjects, or participants older than 22 years.
- Studies were published in the form of editorials, commentary, letters, and reviews.
- Materials were found in recorded, written, or electronic form that were not well indexed, readily available, or peer-reviewed.
- Articles did not address an ASD topic.

Search Strategy. The authors searched the literature and identified 841 articles as potentially eligible for review. Using inclusion and exclusion criteria (see above), the selection process yielded 115 articles: 89 addressing pharmacologic treatments and 26 addressing complementary and alternative medicine (CAM) treatments.

Quality Assessment. The quality of these studies was assessed using a process similar to that reported in the *National Standards Report*, which resulted from the National Standards Project. There were three primary considerations.

- The quality of individual studies was estimated with a **Scientific Merit Rating Scale**.
- **Treatment Effects** were examined to determine whether the effects were beneficial, ineffective, harmful, or unknown.
- The strength of the overall body of evidence related to a particular intervention was graded with a **Strength of Evidence Classification System**. Categories were
 - strong evidence of benefit,
 - marginal evidence of benefit,
 - discrediting evidence of no benefit,
 - evidence of harm, or
 - unestablished evidence.

RESULTS

The authors reported results by the categories of articles reviewed. For both the pharmacologic category and CAM category, the review summarized the findings by scientific merit, treatment effects, and strength of evidence.

StART. INTERVENTIONS WITH EVIDENCE OF EFFECTIVENESS

TABLE 4.17

StART reviewed pharmacologic and complementary and alternative medicine (CAM) interventions for ASDs. The authors found that few medications have substantial evidence supporting their use or non-use with ASDs. The review identified two effective medications. There were no CAM interventions with sufficient evidence to suggest they are effective.

MEDICATIONS

Risperidone	Effective for treating core ASD symptoms (considered globally) and maladaptive behavior (also considered broadly), as well as hyperactivity and irritability. At the time of this review, risperidone was the only medication with U.S. Food and Drug Administration approval for use as a treatment for children and young adults with ASDs.* Risperidone has the strongest level of empirical support.
Methylphenidate	Effective in reducing symptoms of hyperactivity in children with ASD

* Recently, aripiprazole, another atypical antipsychotic, received FDA approval for use in children with ASD.

NOTE: Adapted with permission from “Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments,” by L. C. Huffman, T. L. Sutcliffe, I. S. D. Tanner, and H. M. Feldman, 2011, *Journal of Developmental and Behavioral Pediatrics*, 32, 56-68.

KEY

Effective, Established,
Evidence-based, or Level 1

Ineffective

Emerging, Marginal, or
Level 2

Unestablished, Insufficient
Evidence, or Level 3

StART. INEFFECTIVE INTERVENTIONS

TABLE 4.18

There is sufficient evidence to conclude that the following medications are not effective for the stated purposes.

MEDICATIONS

Methylphenidate	Ineffective for the treatment of restricted, repetitive behavior, or irritability
Naltrexone	No effect on impaired social interaction, impaired communication, or restricted, repetitive behaviors
Secretin	Ineffective with respect to general core symptoms as well as self-stimulatory behaviors, impaired communication, restrictive and repetitive behaviors, and gastrointestinal problems

NOTE: Adapted with permission from “Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments,” by L. C. Huffman, T. L. Sutcliffe, I. S. D. Tanner, and H. M. Feldman, 2011, *Journal of Developmental and Behavioral Pediatrics*, 32, 56-68.

MEDICATIONS

Medications with marginal evidence were reported by their effect on specific domains. In all cases, further research is needed to confirm the findings suggested by these studies.

Core ASD Symptoms (considered globally)	<ul style="list-style-type: none"> ▪ Norepinephrine reuptake inhibitor (NRI) antidepressants (e.g., atomoxetine) ▪ Antihistamines (e.g., cyproheptadine and niaprazine) ▪ Other atypical antipsychotics (e.g., olanzapine and quetiapine) ▪ Cognition enhancers (e.g., galantamine, memantine, and rivastigmine)
Impaired Social Interaction	Cognition enhancers (e.g., galantamine, memantine, and rivastigmine) may have beneficial effects.
Restricted, Repetitive Behaviors	Selective serotonin reuptake inhibitor (SSRI) antidepressants may be of benefit in the treatment of restricted, repetitive behaviors.
Maladaptive Behavior (considered broadly)	<ul style="list-style-type: none"> ▪ Antiepileptics ▪ Naltrexone ▪ Other atypical antipsychotics ▪ Psychostimulants (e.g., methylphenidate)
Hyperactivity	<ul style="list-style-type: none"> ▪ NRI antidepressants ▪ Antiepileptics ▪ Other atypical antipsychotics ▪ Secretin
Dysregulatory Symptoms	Risperidone seems possibly effective in treating sleep problems associated with ASDs.

COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM)**Proteins/Amino Acids**

There is some research suggesting that there may be beneficial effects with regard to impaired social interaction.

NOTE: Adapted with permission from "Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments," by L. C. Huffman, T. L. Sutcliffe, I. S. D. Tanner, and H. M. Feldman, 2011, *Journal of Developmental and Behavioral Pediatrics*, 32, 56-68.

START. INTERVENTIONS WITH INSUFFICIENT EVIDENCE

TABLE 4.20

MEDICATIONS

There are no data for the following pharmacologic treatments that inform their use specifically in the treatment of children with ASDs.

- A number of antidepressants
- Anti-infectives
- Anxiolytics
- Chelators
- Antihypertensives
- Lithium
- Adrenocorticotrophic hormone analog

COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM)

There were inadequate numbers of studies addressing general core systems, impaired communication, or repetitive, restricted behavior to draw conclusions about the presence or absence of benefit. In addition, there were inadequate numbers of studies addressing maladaptive symptoms or dysregulation symptoms to draw any conclusions regarding the presence or absence of benefit.

- Digestive enzymes
- Fatty acids (omega-3 and -6)
- Hormones (melatonin)
- Minerals (Iron, Magnesium)
- Vitamins (B6, B1, Inositol)
- Hyperbaric oxygen
- Modified diets (gluten-free, casein-free, ketogenic)
- Neurofeedback

Effective, Established, Evidence-based, or Level 1
Ineffective
Emerging, Marginal, or Level 2
Unestablished, Insufficient Evidence, or Level 3

NOTE: Adapted with permission from "Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments," by L. C. Huffman, T. L. Sutcliffe, I. S. D. Tanner, and H. M. Feldman, 2011, *Journal of Developmental and Behavioral Pediatrics*, 32, 56-68.

LIMITATIONS OF THE REVIEW

Conclusions based on this comprehensive review were limited by the quantity, breadth, and quality of the studies that were considered. The size of the literature base for this review was small – 115 studies – thus reducing the likelihood of drawing strong conclusions. In addition, the review was limited to research articles published through mid-2007. Since then, new research articles have been published; these may contribute to the identification of additional effective medical interventions. Further, the review was limited to interventions tested in young individuals with ASDs. There may be relevant information in the adult ASD literature or in treatment studies considering conditions that co-occur with ASD diagnosis (but tested in individuals without ASDs). Finally, the quality of the research on medical interventions for ASDs was limited. Of the 115 studies, there were no studies with the highest merit rating score (5) and only 18.3% of the studies received the next highest rating (4).

Evaluation of Comprehensive Treatment Models for Individuals with Autism Spectrum Disorders (CTM)

CONTEXT

There are two classifications of intervention approaches: focused intervention practices and comprehensive treatment models (CTM). Comprehensive treatment models consist of a set of practices designed to achieve broad learning or developmental impact on the core deficits of autism spectrum disorders (ASDs) (National Research Council, 2001). They are used over an extended period of time, are intense in their application, and usually have multiple components. Comprehensive interventions are distinguished from focused interventions which are shorter in duration and designed to produce specific behavioral or developmental outcomes for individuals with ASDs.

Since there is little comparative information available in the literature about comprehensive intervention programs and the literature is often narrow in its focus, the researchers adopted a multidimensional evaluation process. This evaluation process incorporated data from the published literature, procedural information (curriculum used by the model), and data retrieved from program developers.

Odom, S. L., Boyd, B. A., Hall, L. J., & Hume, K. (2010). Evaluation of comprehensive treatment models for individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 40*, 425-436. Retrieved from http://dcautismparents.org/yahoo_site_admin/assets/docs/ABA_14.9261728.pdf

OBJECTIVES OF THE EVALUATION

- Provide evaluative information upon which service providers, family members, and researchers can make decisions about the effectiveness of 30 comprehensive treatment models
- Develop a multi-dimensional approach to evaluate comprehensive treatment models using data from the published literature, procedural information, and data retrieved from comprehensive treatment model program developers

SUMMARY

- Report focus is the evaluation of 30 comprehensive treatment models.
- Evaluation includes a comparative analysis of the efficacy of each model as well as an analysis of five other indicators of the likelihood of a positive intervention outcome.

METHODS

The authors used six criteria to select the 30 comprehensive treatment models included in the evaluation. To be included in the evaluation, the treatment model had to meet the following six criteria:

- A description of the model and its components was published in a refereed journal article, book chapter, or book.
- A single procedural guide, manual, curriculum, or description had to exist to define the model.
- The model had a clear theoretical or conceptual framework.
- The model addressed multiple developmental or behavioral domains that represent the core features of autism spectrum disorders (ASDs).
- The model was intensive (25 hours or more per week), had longevity (9-10 months per year), and/or engagement (i.e., a planned set of activities or procedures to actively engage the child/person with an ASD in learning experiences consistent with the model).
- The model was implemented in at least one site in the U.S.

Identification of Comprehensive Treatment Models. The authors used several methods to identify the comprehensive treatment models that were evaluated. Methods included a review of the literature, collaboration with researchers who conducted the National Standards Project, and solicitation of suggestions of treatment models during public forums and presentations.

Components of the Evaluation System. The authors' evaluation of each treatment model was based on the following features:

- **OPERATIONALIZATION:** The interventions were documented in manuals or procedural guides.
- **IMPLEMENTATION MEASURES:** A reliable and valid implementation measure was present.
- **MODEL REPLICATION:** The model was adopted by persons and organizations other than the original developers.
- **OUTCOME DATA:** The evidence of efficacy was evaluated.
- **QUALITY OF THE RESEARCH METHODOLOGY:** An efficacy study for a comprehensive treatment model was published in a peer-reviewed journal.
- **ADDITIONAL STUDIES:** There is evidence from studies of focused interventions to support specific components of the model.

Evaluation Rating Scale. The data were summarized on a rating scale using a form which was organized into the six evaluation dimensions described above. A 6-point rating system was developed for each dimension with scores ranging from 0 to 5, with 5 being the highest.

RESULTS

A total of 30 comprehensive treatment models were identified using the inclusion/exclusion criteria described above. Table 4.21 lists the comprehensive models studied as well as the evaluation ratings for the six domains. There is not a single summary score for each of the comprehensive models; instead, the evaluation established a profile that reflects the overall quality of each treatment model using the six dimensions of the evaluation.

Evaluation ratings for each domain varied considerably.

Operationalization. Twelve of 30 treatment models specified both the procedures they follow and the content of the curriculum (score of 5). Thirteen other models provided either documented procedures or well-described content (score 3-4).

Implementation. One treatment model, the LEAP model, received the highest rating for this domain (score 5). Five treatment models provided no formal measure of treatment fidelity (score of 0).

Model Replication. Fourteen of 30 models had three or more independent replications (score of 5). Nine of 30 had no replications (score of 0).

Outcome Data. Six of 30 models published at least two articles documenting efficacy of their model in a refereed journal (score of 5).

Quality. The authors used the National Standards Project rating scale to assess the quality of the research reported in peer-reviewed journals. Using this rating scale, the Lovaas Institute, Douglass Developmental Disabilities Center, Responsive Teaching, Children's Toddler Program, and Therapeutic Pathways had the highest ratings, although the quality score for these models was never higher than 3.

Additional Studies. Seven of the 30 models had over 20 journal publications to document the effects of focused interventions which were a component of the model (score of 5).

CTM. COMPREHENSIVE TREATMENT MODELS AND EVALUATION RATINGS

TABLE 4.21

PROGRAM	OPERATIONALIZATION	FIDELITY	REPLICATION	OUTCOME DATA	QUALITY	ADDITIONAL STUDIES
Alpine Learning Group, Paramus, NJ	3	3	5	3	N/A	2
Autism Partnership, Seal Beach, CA	5	3	5	0	N/A	1
Center for Autism and Related Disorders (CARD), Tarzana, CA	5	4	4	3	N/A	2
Children's Toddler School, San Diego, CA	2	3	1	5	3	2
Denver Model, Denver, CO	5	4	5	5	2	0
Developmentally Appropriate Treatment for Autism (DATA), Seattle, WA	3	1	5	3	N/A	2
DIR/Floortime, Bethesda, MD	5	3	5	4	2	0
Douglass Developmental Disabilities Center, New Brunswick, NJ	5	3	0	5	3	5
Eden Institute, Princeton, NJ	3	2	0	0	N/A	0
Hanen Model, Toronto, Ontario, Canada	2	0	1	3	N/A	2
Higashi School, Boston, MA	2	0	2	3	N/A	0
Institute for Child Development-SUNY Binghamton, Vestal, NY	3	2	0	3	N/A	0
Lancaster-Lebanon IU 13, Lancaster County, PA	2	0	0	0	N/A	0
LEAP, Denver, CO	4	5	5	4	2	5
Lovaas Institute, Los Angeles, CA	5	4	5	5	3	5
May Institute, Randolph, MA	5	4	5	4	2	5
Miller Method, Newton, MA	3	1	5	4	0	1
Princeton Child Development Institute, Princeton, NJ	5	4	5	4	2	5
Pivotal Response Treatment, Santa Barbara, CA	4	3	5	2	N/A	5
Pyramid Approach to Education, Newark, DE	2	3	4	3	N/A	5
Responsive Teaching, Cleveland, OH	3	3	0	5	3	0
RDI, Houston, TX	5	3	0	4	2	0
SCERTS Model, Cranston, RI	5	0	0	0	N/A	4
Son-Rise Program, Sheffield, MA	3	0	0	2	N/A	0
STAR, Portland, OR	5	3	5	4	2	0
Summit Academy, Getzville, NY	3	4	0	0	N/A	0
TEACCH, Chapel Hill, NC	3	3	5	5	2	2
Therapeutic Pathways/Kendall School, Modesto, CA	5	4	3	4	3	0
Valley Program, Bergen County, NJ	3	3	5	0	N/A	0
Walden Model, Atlanta, GA	4	3	4	3	N/A	2

NOTE: Adapted from "Evaluation of Comprehensive Treatment Models for Individuals With Autism Spectrum Disorders," by S. K. Odom, B. A. Boyd, L. J. Hall, and K. Hume, 2010, *Journal of Autism and Developmental Disorders*, 40, 425-436.

LIMITATIONS OF THE EVALUATION

- Some models may have been missed during the initial selection process of the evaluation and therefore were not included in the evaluation.
- The term “replication” as it applied to some treatment models was used in the broad sense, i.e., a less rigorous approach, meaning that the treatment model was “adopted” by independent practitioners.
- Only the evaluators of the study participated in the development of the evaluation instrument and criteria.
- The literature review was limited to a specific time period. New literature will impact the results of the evaluation.
- Some of the models which operate in public school districts may not have had resources available to support the work of efficacy research or validating implementation measures. As a result, their low ratings may not indicate that the model is ineffective.

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Appendices



APPENDIX A

Missouri Autism Guidelines Initiative

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Glossary of Terms and Acronyms

TERM	ACRONYM	DEFINITION
Accommodations		In educational settings, accommodations refer to changes made to reduce or eliminate the effects of a disability without changing the instructional content or learning expectations for the student with a disability. Accommodations are intended to enable a student with a disability to fully access the general education curriculum.
Agency for Healthcare Research and Quality	AHRQ	The AHRQ is the nation's lead federal agency for research on health care quality, costs, outcomes, and patient safety. It is the health services research arm of the U.S. Department of Health and Human Services (HHS), complementing the biomedical research mission of its sister agency, the National Institutes of Health. It is the sponsor of one of the research reviews central to this <i>Guide</i> .
Allied Health Interventions		Allied health interventions include therapies typically provided by speech/language therapists, occupational therapists, and physical therapists, including, for example, auditory and sensory integration, music therapy, and language therapies.
Antecedent Package		Antecedent package includes interventions that involve the modification of situational events that typically precede the occurrence of a target behavior. These alterations are made to increase the likelihood of success or reduce the likelihood of problems occurring. Treatments falling into this category reflect research representing the fields of applied behavior analysis (ABA), behavioral psychology, and positive behavior supports.
Applied Behavior Analysis	ABA	<p>Applied behavior analysis (ABA) is a scientific approach to human behavior and learning.</p> <p>In Missouri, in January 2011, HB 1311 went into effect addressing insurance coverage for interventions for individuals with ASDs. The law defines applied behavior analysis as the design, implementation, and evaluation of environmental modifications, using behavioral stimuli and consequences, to produce socially significant improvement in human behavior, including the use of direct observation, measurement, and functional analysis of the relationships between environment and behavior.</p> <p>Many of the behavioral interventions discussed in this <i>Guide</i> are based on ABA principles (e.g., prompting, differential reinforcement, and extinction).</p>

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TERM	ACRONYM	DEFINITION
Autism Spectrum Disorder Screening		ASD screening refers to the use of specific standardized instruments to identify an individual's risk for having an ASD. (For more information see the companion document, <i>Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment</i> .)
Assessment for Intervention Planning		Assessment for intervention planning involves evaluating an individual's functioning across several domains in order to develop a profile of strengths and challenges that informs intervention planning. Assessment for intervention planning expands upon the diagnostic evaluation, capturing the person's heterogeneity and individuality within the diagnostic category. The assessment process results in an individualized profile that informs intervention planning including selection of goals and specific intervention strategies. The intervention plan is designed to maximize the individual's development and functional skills within the context of the family and community environment. (For more information see the companion document, <i>Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment</i> .)
Autism Spectrum Disorders	ASDs	ASDs are a group of neurodevelopmental disorders characterized by impaired social interaction and communication and by restricted or repetitive behaviors. These features are generally identified by the age of 3 years and are frequently associated with other physical and mental health conditions. The developmental challenges and associated problems in individuals with ASDs vary widely. Symptom presentation and degree of impairment can vary not only among individuals but also within the same individual over time. This <i>Guide</i> uses the term ASD to include Autistic Disorder, Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), and Asperger's Disorder.
Autism Treatment Network	ATN	The ATN is the nation's first network of hospitals and physicians dedicated to developing a model of comprehensive medical care for children and adolescents with autism. It is committed to developing standard treatment protocols for physical health conditions based on proven clinical experience and evidence from a patient registry and related clinical research projects.
Behavioral Intervention		A behavioral intervention is a term that may be used generally or specifically in relation to ASD interventions. In general terms, as presented in Chapter Three, behavioral interventions are strategies that seek to change individual behaviors or skills by modifying the environment, rather than introducing external substances like medications. Behavioral interventions are used to address problem behaviors, teach developmentally appropriate skills including social, communication, academic, and adaptive skills, and to train parents to teach effectively. The term behavioral interventions also may be used to describe specific interventions that draw from the principles and practices of applied behavior analysis (ABA).

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TERM	ACRONYM	DEFINITION
Behavioral Package		Behavioral package includes interventions that are designed to reduce problem behaviors and teach functional alternative behaviors or skills through the application of basic principles of behavior change. Interventions falling into this category reflect research representing the fields of applied behavior analysis (ABA), behavioral psychology, and positive behavior supports (PBS).
Centers for Medicare and Medicaid Services	CMS	The Centers for Medicare and Medicaid Services (CMS), formerly the Health Care Financing Administration (HCFA), administers Medicare, Medicaid, related quality assurance programs, and other federal programs. It is the sponsor of one of the research reviews central to this <i>Guide</i> .
Cognitive Behavioral Interventions		Cognitive behavioral interventions are designed to change negative or unrealistic thought patterns and behaviors with the aim of positively influencing emotions and life functioning. The concept is that a change in the interpretation of a situation or relationship will also change the emotions, feelings, and/or perceptions that are associated with that situation or relationship.
Complementary and Alternative Medicine Treatments	CAM	CAM treatments are nonprescribed therapies, including, but not limited to, botanicals, vitamins, minerals, other “natural products,” mind-body medicine, and manipulative practices.
Comprehensive Behavioral Intervention Programs for Young Children		This intervention category reflects research from programs designed to offer comprehensive treatment of the core symptoms of autism. The comprehensive model involves a combination of applied behavior analytic procedures which are delivered to young children (generally under the age of 8). These treatments may be delivered in a variety of settings (e.g., home, self-contained classroom, inclusive classroom, community) and involve a low student-to-teacher ratio. These programs sometimes are referred to as Early Intensive Behavioral Intervention (EIBI), Applied Behavioral Analysis (ABA), or behavioral inclusive programs.
Comprehensive Interventions		Comprehensive interventions are designed to address a broad array of skills or behaviors for individuals with ASDs. They are used over an extended period of time, are intense in their application (up to 40 hours per week), and usually have multiple components. Comprehensive interventions are defined in contrast to focused interventions.
Computer-aided Instruction	CAI	CAI is the use of computers for various types of instruction.
Control(s)		In research experimentation, ideally a control or control group is exposed to every influence that the experimental group is exposed to <u>except</u> the independent variable. If there are measured differences in the dependent variable when the control and experimental groups are compared, the difference can be attributed to the treatment effect, i.e., an effect of the independent variable.

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TERM	ACRONYM	DEFINITION
Core Symptoms		Core symptoms describe the central clinical features of ASDs. These features include impaired social interaction, delayed or absent communication, and different forms of restricted, repetitive, and stereotyped patterns of behavior, interests, and activities.
Comprehensive Treatment Model	CTM	CTM is the term used by Dr. Odom and his colleagues to describe the types of programs evaluated in their research, which is summarized in this <i>Guide</i> .
Diagnostic Evaluation		Diagnostic evaluation is the process of gathering information via interview, direct observation and interaction, and use of standardized tests, as needed, to determine if an individual meets criteria for a specific diagnosis. (For more information see the companion document, <i>Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis and Assessment</i> .)
Differential Reinforcement		Differential reinforcement is used in behaviorally based strategies that focus reinforcement on alternative, incompatible, other, or lower rates of the interfering behavior in order to replace it with more appropriate behavior.
Discrete Trial Training	DTT	DTT is a one-to-one instructional strategy that teaches skills in a planned, controlled, and systematic manner.
Early Intensive Behavioral Intervention	EIBI	EIBI is another term often used to describe comprehensive behavioral intervention programs for young children. EIBI involves a combination of applied behavior analytic (ABA) procedures (e.g., discrete trial, incidental teaching, etc.) that are delivered to young children (generally under the age of 8) on an intensive basis (e.g., 20-40 hours per week). EIBI may be delivered in a variety of settings (e.g., home, self-contained classroom, inclusive classroom, community) and involve a low student-to-teacher ratio (e.g., 1:1).
Early Intervention		Early intervention is a system of coordinated services that promotes the child's growth and development and supports families during the critical early years. Early intervention services to children and their families are federally mandated through the Individuals with Disabilities Education Act. In Missouri, Early Intervention services are provided through the First Steps program.
Educational Interventions		Educational interventions focus on improving educational outcomes in school settings. The term generally refers to behavioral or academic interventions that are either universal (applied to all students) or targeted (applied to an individual student). Educational interventions are intended to be administered primarily in educational settings and can involve regular education staff and/or special education staff, including therapists, depending on the needs of the student(s).

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TERM	ACRONYM	DEFINITION
Effective ASD Interventions		The term “effective ASD interventions” is used by consensus of the Missouri Autism Guidelines Initiative to describe interventions ranked at the top level of research support by one or more of the systematic reviews summarized in this <i>Guide</i> . The overall list of effective interventions presented in Chapter Three provides a synthesis of findings across reviews; individual findings from each review are summarized separately in Chapter Four.
Effectiveness		Effectiveness is a measure of the extent to which the intervention changes the expected outcome. How well the intervention generalizes to other people and environments (e.g., school, other clinical settings) and to the natural environment is also a measure of effectiveness.
Efficacy		Efficacy refers to the strength of the causal relationship between the intervention and its intended outcomes. It answers the question, “Does it work?”
Evidence-based Interventions		Evidence-based interventions are derived from high quality, independently replicated research studies that show sufficient evidence of effectiveness.
Evidence-based Practice		Evidence-based practice bridges the science-to-practice gap by using evidence-based research to inform clinical practice in the context of the client’s diagnosis, age, assessed needs, and living environment. There are three key considerations to selecting evidence-based practices: best research evidence, clinical expertise and judgment, and client characteristics and values.
Evidence-based Rating Scales		Evidence-based rating scales measure the degree of scientific support for a specific intervention. Degree of evidence is measured on a continuum and is used to identify (a) interventions that have little or no evidence, (b) those that are independently substantiated by objective evidence, and (c) those that show promise based on the available evidence. Evidence-based rating scales have been developed and implemented in each of the authoritative reviews referenced in this document.
Extinction		Extinction is a behaviorally based strategy that withdraws or terminates the reinforcement of an interfering behavior to reduce or eliminate the behavior.
Fidelity		Fidelity (treatment fidelity) is a scientific term that describes the degree to which an intervention is delivered in the way in which it was designed to be delivered.
Focused Interventions		Focused interventions, in contrast to comprehensive interventions, are individual strategies designed to address specific behavioral or developmental outcomes for individuals with ASDs. They may be used alone or in combination for a limited period of time to change a specific behavior or teach a specific skill.

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TERM	ACRONYM	DEFINITION
Free Appropriate Public Education	FAPE	FAPE is the legal standard that must be met for all qualified children in public schools under the IDEA and Section 504 of the Rehabilitation Act of 1973. Under the IDEA, an IEP must be developed and implemented that offers educational benefits to the student with disabilities; under Section 504, students with disabilities must receive an education comparable to that provided to students without disabilities and one that addresses the child's disability-related needs.
Functional Behavioral Assessment	FBA	FBA is a systematic approach in which data are collected to identify events that reliably predict and maintain problem behaviors.
Functional Communication Training	FCT	A systematic practice of replacing inappropriate or ineffective behavior with more appropriate or effective behavior that serves the same function.
General Curriculum		Curriculum adopted by a Local Educational Agency (LEA) or a State Education Agency (SEA) for all children from preschool through high school.
Inclusion Criteria		Inclusion criteria are standards that an individual research study must meet in order to be included in a systematic research review. Only studies that meet certain criteria for research design, subject selection, measures of the dependent variable, etc., are included in the review. The six research reviews referenced in this document used slightly different inclusion and exclusion criteria.
Individuals with Disabilities Education Act	IDEA	Originally passed in 1975 (P.L. 94-142) as the Education for All Handicapped Children Act, amendments to the law, enacted in 1990, changed the name to the Individuals with Disabilities Education Act. Amendments to the Act in 1997 and 2004 further clarified and extended the law. It is the primary federal law governing the education of students with disabilities in public schools. Some federal funds are provided to public schools through the Act, which ensures access to public schools for all students with disabilities. Part B of IDEA pertains to individuals ages 3 through 21 years. Part C of IDEA pertains to children from birth to 3 years.
Individualized Education Program	IEP	An IEP is the official and legal plan that documents the process and the offer of FAPE for a student with disabilities under Part B of the IDEA. The IDEA mandates both process and content of the IEP. Parents are specified members of the IEP team and work collaboratively with school personnel to develop an IEP that will meet the individualized needs of their child.
Individualized Family Service Plan	IFSP	IFSP is plan that documents and guides the early intervention process for children birth to 36 months with disabilities and their families under Part C of the IDEA. At age 3 years, if the child meets the eligibility criteria under Part B of the IDEA, an IEP will be written.

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TERM	ACRONYM	DEFINITION
Interdisciplinary Team		Interdisciplinary team refers to a group of professionals from various disciplines that provide services to individuals with ASDs. Members of the interdisciplinary team might participate during the assessment for intervention and intervention planning process to gain consensus on which interventions are most appropriate, identify barriers to progress, define outcome measures, etc. Interdisciplinary team members may include behavioral or developmental psychologists, special educators, behavior specialists, applied behavior analysts, pediatricians, speech and language specialists,, or other specialists, as indicated.
Intervention		Intervention refers to any technique, method, therapy, treatment, model, program, or substance that might affect the behavior or symptoms of a person with an ASD. Intervention is primarily intended to bring about developmental improvement in the core symptoms of ASD. An intervention might address as many as six to eight areas of development with multiple teaching objectives within each area. Interventions also are used to reduce or replace problem behaviors. In this document, this term often is used interchangeably with the term “treatment.”
Joint Attention Intervention		Joint attention is an intervention that refers to an individual's ability to share with another person the experience of an object of interest. Joint attention generally emerges between 8 and 12 months of age. A moving toy, for example, typically elicits a pointing behavior by the child, who looks alternately at the caregiver and the object. Establishment of joint attention is pivotal to development of many other critical developmental skills.
Least Restrictive Environment	LRE	LRE is a requirement to educate students with disabilities with peers without disabilities to the maximum extent appropriate.
Missouri Autism Guidelines Initiative	Initiative	<i>Autism Spectrum Disorders: Guide to Evidence-based Interventions</i> is the result of an 18-month collaboration between professionals and parents. The Initiative contributors are listed in Appendix A. The <i>Guide</i> is sponsored by the Thompson Foundation for Autism; the Division of Developmental Disabilities, Missouri Department of Mental Health; the Missouri Department of Elementary and Secondary Education; and Mercy Children's Hospital – St. Louis and Springfield. Additional funding was provided by the Missouri Foundation for Health. The Missouri Autism Guidelines Initiative also developed a prior consensus publication, <i>Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment</i> .
Medical Interventions		Medical interventions typically include the administration of external substances to the body to treat symptoms of ASDs. Medical treatments for ASD symptoms comprise a variety of medications and modalities such as therapeutic diets, supplements, hormonal supplements, hyperbaric oxygen, and chelating agents.

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TERM	ACRONYM	DEFINITION
Modeling		Modeling is an intervention that relies on an adult or peer providing a demonstration of the target behavior that should result in an imitation of the target behavior by the individual with an ASD. Modeling can include simple and complex behaviors. This intervention is often combined with other strategies, such as prompting and reinforcement.
Modifications		Modifications are alterations made to instruction and/or assessment that change, lower, or reduce learning or assessment expectations. Modifications include changes in instructional level, content, and performance criteria; may include changes in test form or format; and include alternate assessments.
Multi-component Package		These interventions involve a combination of multiple treatment procedures that are derived from different fields of interest or different theoretical orientations.
National Autism Center	NAC	The National Autism Center, a nonprofit organization, is dedicated to serving children and adolescents with autism spectrum disorders by providing reliable information, promoting best practices, and offering comprehensive resources for families, practitioners, and communities. It is the sponsor of one of the research reviews central to this <i>Guide</i> .
National Professional Development Center	NPDC	The National Professional Development Center is a multi-university center to promote the use of evidence-based practice for children and adolescents with autism spectrum disorders. The Center works in coordination with each state's Department of Education, Part C Agency, and University Center for Excellence in Developmental Disabilities to provide professional development to teachers and practitioners who serve individuals from birth through 22 years with autism spectrum disorders. It is the sponsor of one of the research reviews central to this <i>Guide</i> .
National Standards Project	NSP	The National Standards Project is an effort funded by the National Autism Center (NAC) to produce a set of standards for effective, research-validated education of and behavioral interventions for children with autism spectrum disorders (ASDs).
National Standards Report	NSR	The <i>National Standards Report</i> is the document produced by the National Standards Project in 2009. The <i>National Standards Report</i> is one of the research reviews central to the development of this document.
Naturalistic Interventions		Naturalistic interventions use primarily child-directed interactions to teach functional skills in the natural environment. These interventions often involve providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts.

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TERM	ACRONYM	DEFINITION
No Child Left Behind Act	NCLB	This federal legislation amends the Elementary and Secondary Education Act (ESEA) and identifies specific steps that states, school districts, and schools must take to improve academic performance, including administering regular assessments to all students with and without disabilities and developing accountability systems to track academic progress.
Operationalization		In the context of the Comprehensive Treatment Models (CTM) review, the term operationalization means that an intervention is documented in manuals or procedural guides well enough for individuals from outside the project to be able to implement or replicate the intervention.
Packaged Interventions		Researchers at the National Autism Center used this term when they reported research findings by intervention categories. In these cases, the researchers combined focused interventions that were substantially similar into a single intervention category.
Parent Implemented Interventions		Parent implemented interventions are strategies that recognize and use parents as the most effective teachers of their children.
Peer Review		Peer review is evaluation of a researcher's methods and results by a committee of others in the same field who determine scientific merit and accuracy. Peer review is generally required by academic and scientific journals.
Peer Mediated Interventions		Peer mediated interventions are defined as interventions that target academic skills by involving same-age peers in the learning process. This approach is also described as peer tutoring.
Pharmacological Interventions		Pharmacological interventions are those that are regulated by the Food and Drug Administration, including prescription medicines (i.e., any drug product that requires a doctor's authorization to purchase), brand-name products, and generic drugs.
Picture Exchange Communication System™	PECS™	PECS™ is a system of communication that uses the physical handing over of pictures or symbols to initiate communicative functions (see www.pecs.com).
Pivotal Response Training	PRT	PRT includes treatments that focus on targeting "pivotal" behavioral areas, such as motivation to engage in social communication, self-initiation, self-management, and responsiveness to multiple cues. Key aspects of PRT intervention delivery focus on parent participation in the intervention and delivery of teaching opportunities in the natural environment, such as the home and school.

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TERM	ACRONYM	DEFINITION
Positive Behavioral Supports	PBS	PBS is a general term that refers to the application of behavioral interventions based on environmental modifications to achieve behavior change.
Professional Judgment		Professional judgment involves integrating professional experience and information about individual characteristics with relevant research findings and data gathered via assessment and progress monitoring.
Prompting		Prompting is a behaviorally based antecedent teaching strategy.
Randomized Clinical Trials	RCT	Randomized clinical trials are research studies in which individuals are randomly placed into one of two conditions: a control condition, and a treatment condition. Randomized assignment reduces error variance in outcome measures and increases overall validity of the study.
Reinforcement		Reinforcement is a behaviorally based consequence teaching strategy.
Replication		In the context of the Comprehensive Treatment Models (CTM) research review, the term replication means that an intervention has been implemented by someone other than the developer of the intervention. In addition, supervision of the intervention replication is provided by an independent researcher and is located separately from the developer's site.
Research-based Curricula		Research-based curricula incorporate design features that have been researched and are evidence based; however, the curricula as a whole have not been studied using rigorous research designs.
Response Interruption/Redirection	RIR	RIR is the physical prevention or blocking of interfering behavior with redirection to more appropriate behavior.
Schedules		Schedules are used in interventions that involve the presentation of a task list that communicates a series of activities or steps required to complete a specific activity. Schedules can take several forms, including written words, pictures or photographs, or work stations.
Self-management		Self-management is an intervention that involves promoting independence by teaching individuals with ASDs to regulate their behavior by recording the occurrence/nonoccurrence of the target behavior and securing reinforcement for doing so.
Single-Subject Design		Single-subject design is a type of research that measures the effect(s) of an independent variable by recording changes in an individual's behavior under carefully controlled and differing treatment conditions.

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TERM	ACRONYM	DEFINITION
Social Communication Intervention		These psychological interventions involve targeting some combination of impairments such as pragmatic communication skills and the inability to successfully read social situations.
Social Narratives		Social narratives are written scripts that describe specific social situations in some detail and are aimed at helping the individual adjust to the situation or adapt their behavior.
Social Skills Intervention		Social skills interventions use structured interactions between children and parents or facilitators to improve greetings, spontaneous initiations, eye contact, imitation, joint attention, or the child's ability to engage in symbolic play.
Special Education		Special education refers to professionals and practices providing individualized learning experiences for students with special needs. It describes, in part, specially designed instruction to meet the unique needs of a child with a disability.
Specially Designed Instruction		This term means adapting, as appropriate, to the needs of an eligible child, the content, methodology, or delivery of instruction to address the unique needs of the child that result from the child's disability, and to ensure access to the general curriculum so that he or she can meet the educational standards within the jurisdiction of the relevant public agency.
Speech Generating Devices	SGD	SGDs are electronic, portable devices used to teach learners communication skills and as a means of communication.
Stanford Autism Research Team	StART	Stanford Autism Research Team is the author of one of the research reviews central to this document.
Stimulus Control/Environmental Modification		This term describes the modification or manipulation of environmental aspects known to impact a learner's behavior.
Structured Teaching		Structured teaching includes interventions based on neurological characteristics of individuals with autism and may also be referred to as TEACCH.
Structured Work Systems		These visually and physically structured sequences provide opportunities for learners to practice previously taught skills, concepts, or activities. Structured work systems are one component of structured teaching.
Supplementary Aids and Services		These aids, services, and supports are provided in regular education classes that enable children with disabilities to be educated with non-disabled children to the maximum extent appropriate.

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TERM	ACRONYM	DEFINITION
Supported Employment		Supported employment focuses on enabling a person with an ASD to secure and maintain a paid job in a regular work environment by providing all appropriate training and support.
Systematic Review		Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strengths and limits of evidence from research studies about the effectiveness and safety of the intervention.
Task Analysis and Chaining		Behaviorally based antecedent teaching strategy that breaks down steps and links them for prompting.
TEACCH		TEACCH is a comprehensive structured teaching approach developed at the University of North Carolina-Chapel Hill. It is based on: understanding the culture of autism; developing an individual person- and family-centered plan for each student; structuring the physical environment to enhance learning; using visual supports to make the sequence of daily activities predictable and understandable; and using visual supports to make individual tasks understandable.
Technology-based Treatment		An intervention that presents instructional materials using the medium of computers or related technologies.
Time Delay		Time delay is a behaviorally based antecedent teaching strategy that promotes errorless learning.
Treatment		The term treatment is usually understood as a service to correct or alleviate a specific medical condition, issue, or problem. In this document, treatment refers to interventions designed to improve the lives of persons with ASDs.
Vanderbilt Evidence-based Practice Team		Vanderbilt's practice team is one of 15 national Evidence-based Practice Centers awarded funding by the AHRQ to undertake systematic reviews of available evidence concerning various topics. The Vanderbilt team conducted the research for AHRQ on evidence-based ASD interventions. The review by Vanderbilt is included in this document as one of the six research reviews of evidence-based practice.
Video Modeling		Video modeling utilizes assistive technology as the core component of instruction and allows for pre-rehearsal of the target behavior or skill via observation.
Visual Supports		Visual supports are tools that enable a learner to independently track events and activities.

Effective ASD Interventions by Domain

Some of the systematic reviews discussed in this *Guide*, such as the reviews by the National Professional Development Center (NPDC), National Standards Project (NSP), and Centers for Medicare and Medicaid Services (CMS), provide detailed information about the specific domains or skill areas for which research supports the effectiveness of an intervention. This information can be found in the review summaries provided in Chapter Four and in the original publications.

For the purposes of this *Guide*, four broad goal areas – social, communication, behavior, and academic – were developed to summarize the more numerous and varied categories used across the reviews. As a reference for readers interested in a more in-depth understanding of how information was synthesized across the reviews, the definitions provided below specify the NPDC, NSP, and CMS categories that were incorporated into the four broad goal areas used in this *Guide*.

In Chapter Three, Table 3.6 indicates which interventions have evidence of effectiveness for each general skill area. Tables C.1-C.4 provide more detailed information about which systematic reviews include evidence that an intervention is effective in a particular skill area.

Social (**TABLE C.1**) refers to skills involved in social interaction such as joint attention, friendship skills, pretend play, social engagement, social problem solving skills, and appropriate participation in group activities. It includes the categories of interpersonal skills (NSP), play (NSP & NPDC), social (NPDC), and social development (CMS).

Communication (**TABLE C.2**) refers to skills involved in verbally or nonverbally signaling information to a social partner such as requesting, labeling, receptive and expressive language, conversation, greetings, speech, and pragmatics. Communication is a category used by NSP, CMS, and NPDC.

Behavior (**TABLE C.3**) refers to skills that include the behavior category used by NPDC, as well as personal responsibility (NSP); self-regulation (NSP); general symptoms (NSP); problem behaviors (NSP & CMS); restricted, repetitive, nonfunctional patterns of behavior, interests, or activities (NSP); sensory or emotional regulation (NSP); adaptive behavior (CMS); and transitions (NPDC).

Academic (**TABLE C.4**) refers to skills that are required for success with school activities. It includes the academic category used by NSP and NPDC, as well as learning readiness (NSP), higher cognitive functions (NSP), motor skills (NSP), cognitive development (CMS), and sensory and motor development (CMS).

GUIDELINES FOR INTERPRETING TABLES C.1-C.4

- Reviews are identified by the following abbreviations:
 - National Professional Development Center (**NPDC**)
 - IMPAQ on behalf of the Centers for Medicare and Medicaid Services (**CMS**)
 - National Standards Project sponsored by the National Autism Center (**NSP**)
 - Vanderbilt Evidence-based Practice Center on behalf of Agency for Healthcare Research and Quality (**AHRQ**)
 - Stanford Autism Research Team (**StART**)
- Checkmarks indicate that the systematic review contains evidence that the intervention is effective in addressing the specific skill area.
- If no benefit for a skill area is noted, it does not mean that there are no possible benefits; rather, it indicates that the systematic reviews did not provide specific evidence of effectiveness in that area.
- *Emerging or Insufficient Evidence* indicates that the intervention was not ranked as having a high level of evidence by that review; therefore, the intervention is not considered effective for the specific skill areas.
- *Not reviewed* indicates that the intervention was not considered in that particular review; as noted in Chapter Three, there are many reasons why a specific intervention may not have been reviewed. For example, it may mean that the focus of the review did not include that type of intervention or that no studies met the criteria required to be included in the review. Further detail is available in the summaries of each review provided in Chapter Four.

APPENDIX C

EFFECTIVE ASD INTERVENTIONS BY SOCIAL DOMAIN

TABLE C.1

COMPREHENSIVE BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Comprehensive Behavioral Intervention Programs for Young Children	Not Reviewed	✓	✓	Social Benefit Not Reported
Structured Teaching	Not Reviewed	✓	Emerging	Insufficient Evidence

FOCUSED BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Antecedent Package	Not Reviewed as a Package	✓	✓	Not Reviewed
Prompting	Social Benefit Not Reported	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Stimulus Control/Environmental Modification	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Time Delay	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Behavioral Package	Not reviewed as a package	✓	✓	Not Reviewed
Differential Reinforcement	Social Benefit Not Reported	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Discrete Trial Training		Emerging (as part of Reductive Package)	Emerging (as part of Reductive Package)	Not Reviewed
Extinction		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Behavioral Assessment		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Communication Training		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Reinforcement		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Response Interruption/Redirection		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Task Analysis and Chaining	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Cognitive Behavioral Interventions	Not Reviewed	✓	Emerging	Insufficient Evidence
Joint Attention Intervention	Not Reviewed	✓	✓	Insufficient Evidence
Modeling	Not Reviewed	Emerging	✓	Insufficient Evidence
Video Modeling	✓	Emerging	✓	Not Reviewed

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EFFECTIVE ASD INTERVENTIONS BY SOCIAL DOMAIN

TABLE C.1

	NPDC	CMS	NSP	AHRQ
Multi-component Package	Not Reviewed	✓	Emerging	Not Reviewed
Naturalistic Interventions	✓	✓	✓	Not Reviewed
Parent Implemented Interventions	✓	Not Reviewed	Not reviewed	Insufficient Evidence
Peer Mediated Interventions	✓	✓	✓	Insufficient Evidence
Picture Exchange Communication System	✓	✓	Emerging	Insufficient Evidence
Pivotal Response Training	✓	Emerging	✓	Insufficient Evidence
Schedules	Not Reviewed	✓	Social Benefit Not Reported	Not Reviewed
Self-management	✓	Emerging	✓	Not Reviewed
Social Communication Intervention	Not Reviewed	✓	Emerging	Insufficient Evidence
Social Narratives	✓	✓	✓	Not Reviewed
Social Skills Intervention	✓	✓	Emerging	Insufficient Evidence
Speech Generating Devices	✓	Emerging	Emerging	Not Reviewed
Structured Work Systems	Social Benefit Not Reported	Not Reviewed	Not Reviewed	Not Reviewed
Supported Employment	Not Reviewed	✓	Not Reviewed	Not Reviewed
Technology-based Treatment	Not Reviewed	✓	Emerging	Not Reviewed
Computer-aided Instruction	✓	✓	Emerging	Insufficient Evidence
Visual Supports	✓	Not Reviewed	Not Reviewed	Not Reviewed

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS

Medications

	StART	AHRQ
Aripiprazole	Not Reviewed	Social Benefit Not Reported
Methylphenidate*	Social Benefit Not Reported	Insufficient Evidence
Risperidone	Social Benefit Not Reported	Social Benefit Not Reported

*StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

APPENDIX C

EFFECTIVE ASD INTERVENTIONS BY COMMUNICATION DOMAIN

TABLE C.2

COMPREHENSIVE BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Comprehensive Behavioral Intervention Programs for Young Children	Not Reviewed	✓	✓	✓
Structured Teaching	Not Reviewed	✓	Emerging	Insufficient Evidence

FOCUSED BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Antecedent Package	Not Reviewed as a Package	✓	✓	Not Reviewed
Prompting	Communication Benefit Not Reported	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Stimulus Control/Environmental Modification	Communication Benefit Not Reported	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Time Delay	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Behavioral Package	Not reviewed as a package	✓	✓	Not Reviewed
Differential Reinforcement	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Discrete Trial Training	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Extinction	✓	Emerging (as part of Reductive Package)	Emerging (as part of Reductive Package)	Not Reviewed
Functional Behavioral Assessment	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Communication Training	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Reinforcement	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Response Interruption/Redirection	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Task Analysis and Chaining	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Cognitive Behavioral Interventions	Not Reviewed	✓	Emerging	Insufficient Evidence
Joint Attention Intervention	Not Reviewed	✓	✓	Insufficient Evidence
Modeling	Not Reviewed	Emerging	✓	Insufficient Evidence
Video Modeling	✓	Emerging	✓	Not Reviewed

(CONTINUED)

(CONTINUED)

EFFECTIVE ASD INTERVENTIONS BY COMMUNICATION DOMAIN

TABLE C.2

	NPDC	CMS	NSP	AHRQ
Multi-component Package	Not Reviewed	✓	Emerging	Not Reviewed
Naturalistic Interventions	✓	✓	✓	Not Reviewed
Parent Implemented Interventions	✓	Not Reviewed	Not reviewed	Insufficient Evidence
Peer Mediated Interventions	✓	✓	✓	Insufficient Evidence
Picture Exchange Communication System	✓	✓	Emerging	Insufficient Evidence
Pivotal Response Training	✓	Emerging	✓	Insufficient Evidence
Schedules	Not Reviewed	✓	Communication Benefit Not Reported	Not Reviewed
Self-management	✓	Emerging		Not Reviewed
Social Communication Intervention	Not Reviewed	✓	Emerging	Insufficient Evidence
Social Narratives	✓	✓	Communication Benefit Not Reported	Not Reviewed
Social Skills Intervention	✓	✓		Insufficient Evidence
Speech Generating Devices	✓	Emerging	Emerging	Not Reviewed
Structured Work Systems	Communication Benefit Not Reported	Not Reviewed	Not Reviewed	Not Reviewed
Supported Employment	Not Reviewed	✓	Not Reviewed	Not Reviewed
Technology-based Treatment	Not Reviewed	✓	Emerging	Not Reviewed
Computer-aided Instruction	✓	✓	Emerging	Insufficient Evidence
Visual Supports	✓	Not Reviewed	Not Reviewed	Not Reviewed

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS**Medications**

	StART	AHRQ
Aripiprazole	Not Reviewed	Communication Benefit Not Reported
Methylphenidate*	Communication Benefit Not Reported	Insufficient Evidence
Risperidone	Communication Benefit Not Reported	Communication Benefit Not Reported

* StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

APPENDIX C
EFFECTIVE ASD INTERVENTIONS BY BEHAVIOR DOMAIN

TABLE C.3

COMPREHENSIVE BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Comprehensive Behavioral Intervention Programs for Young Children	Not Reviewed	✓	✓	✓
Structured Teaching	Not Reviewed	✓	Emerging	Insufficient Evidence

FOCUSED BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Antecedent Package	Not Reviewed as a Package	✓	✓	Not Reviewed
Prompting	Behavior Benefit Not Reported	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Stimulus Control/Environmental Modification	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Time Delay	Behavior Benefit Not Reported	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Behavioral Package	Not reviewed as a package	✓	✓	Not Reviewed
Differential Reinforcement	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Discrete Trial Training	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Extinction	✓	Emerging (as part of Reductive Package)	Emerging (as part of Reductive Package)	Not Reviewed
Functional Behavioral Assessment	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Communication Training	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Reinforcement	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Response Interruption/Redirection	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Task Analysis and Chaining	✓	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Cognitive Behavioral Interventions	Not Reviewed	✓	Emerging	Insufficient Evidence
Joint Attention Intervention	Not Reviewed	✓	Behavior Benefit Not Reported	Insufficient Evidence
Modeling	Not Reviewed	Emerging	✓	Not Reviewed
Video Modeling	✓	Emerging	✓	Not Reviewed

(CONTINUED)

(CONTINUED)

EFFECTIVE ASD INTERVENTIONS BY BEHAVIOR DOMAIN		TABLE C.3			
		NPDC	CMS	NSP	AHRQ
Multi-component Package	Not Reviewed	✓		Emerging	Not Reviewed
Naturalistic Interventions	Behavior Benefit Not Reported	✓		Behavior Benefit Not Reported	Not Reviewed
Parent Implemented Interventions	✓	Not Reviewed		Not reviewed	Insufficient Evidence
Peer Mediated Interventions	✓	Behavior Benefit Not Reported		✓	Insufficient Evidence
Picture Exchange Communication System	✓	✓		Emerging	Insufficient Evidence
Pivotal Response Training	✓	Emerging		Behavior Benefit Not Reported	Insufficient Evidence
Schedules	Not Reviewed	✓		✓	Not Reviewed
Self-management	✓	Emerging		✓	Not Reviewed
Social Communication Intervention	Not Reviewed	Behavior Benefit Not Reported		Emerging	Insufficient Evidence
Social Narratives	✓	✓		✓	Not Reviewed
Social Skills Intervention	Behavior Benefit Not Reported	Behavior Benefit Not Reported		Emerging	Insufficient Evidence
Speech Generating Devices	Behavior Benefit Not Reported	Emerging		Emerging	Not Reviewed
Structured Work Systems	✓	Not Reviewed		Not Reviewed	Not Reviewed
Supported Employment	Not Reviewed	✓		Not Reviewed	Not Reviewed
Technology-based Treatment	Not Reviewed	✓		Emerging	Not Reviewed
Computer-aided Instruction	Behavior Benefit Not Reported	✓		Emerging	Insufficient Evidence
Visual Supports	✓	Not Reviewed		Not Reviewed	Not Reviewed

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS					
Medications					
		StART		AHRQ	
Aripiprazole		Not Reviewed		✓	
Methylphenidate*		✓		Insufficient Evidence	
Risperidone		✓		✓	

*StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

APPENDIX C
EFFECTIVE ASD INTERVENTIONS BY ACADEMIC DOMAIN

TABLE C.4

COMPREHENSIVE BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Comprehensive Behavioral Intervention Programs for Young Children	Not Reviewed	✓	✓	✓
Structured Teaching	Not Reviewed	✓	Emerging	Insufficient Evidence

FOCUSED BEHAVIORAL INTERVENTIONS

	NPDC	CMS	NSP	AHRQ
Antecedent Package	Not Reviewed as a Package	✓	✓	Not Reviewed
Prompting	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Stimulus Control/Environmental Modification	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Time Delay	✓	Not reviewed individually; see Antecedent Package	Not reviewed individually; see Antecedent Package	Not Reviewed
Behavioral Package	Not reviewed as a package	✓	✓	Not Reviewed
Differential Reinforcement	Academic Benefit Not Reported	Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Discrete Trial Training		Emerging (as part of Reductive Package)	Emerging (as part of Reductive Package)	Not Reviewed
Extinction		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Behavioral Assessment		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Functional Communication Training		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Reinforcement		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Response Interruption/Redirection		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Task Analysis and Chaining		Not reviewed individually; see Behavioral Package	Not reviewed individually; see Behavioral Package	Not Reviewed
Cognitive Behavioral Interventions	Not Reviewed	✓	Emerging	Insufficient Evidence
Joint Attention Intervention	Not Reviewed	✓	Academic Benefit Not Reported	Insufficient Evidence
Modeling	Not Reviewed	Emerging	✓	Insufficient Evidence
Video Modeling	Academic Benefit Not Reported	Emerging	✓	Not Reviewed

(CONTINUED)

(CONTINUED)

EFFECTIVE ASD INTERVENTIONS BY ACADEMIC DOMAIN			TABLE C.4	
	NPDC	CMS	NSP	AHRQ
Multi-component Package	Not Reviewed	✓	Emerging	Not Reviewed
Naturalistic Interventions	Academic Benefit Not Reported	Academic Benefit Not Reported	✓	Not Reviewed
Parent Implemented Interventions		Not Reviewed	Not reviewed	Insufficient Evidence
Peer Mediated Interventions		✓	Academic Benefit Not Reported	Insufficient Evidence
Picture Exchange Communication System		Academic Benefit Not Reported	Emerging	Insufficient Evidence
Pivotal Response Training		Emerging	Academic Benefit Not Reported	Insufficient Evidence
Schedules	Not Reviewed	✓	Academic Benefit Not Reported	Not Reviewed
Self-management	✓	Emerging	Academic Benefit Not Reported	Not Reviewed
Social Communication Intervention	Not Reviewed	Academic Benefit Not Reported	Emerging	Insufficient Evidence
Social Narratives	Academic Benefit Not Reported	Academic Benefit Not Reported	Academic Benefit Not Reported	Not Reviewed
Social Skills Intervention	Academic Benefit Not Reported	Academic Benefit Not Reported	Emerging	Insufficient Evidence
Speech Generating Devices	Academic Benefit Not Reported	Emerging	Emerging	Not Reviewed
Structured Work Systems	✓	Not Reviewed	Not Reviewed	Not Reviewed
Supported Employment	Not Reviewed	✓	Not Reviewed	Not Reviewed
Technology-based Treatment	Not Reviewed	✓	Emerging	Not Reviewed
Computer-aided Instruction	✓	✓	Emerging	Insufficient Evidence
Visual Supports	✓	Not Reviewed	Not Reviewed	Not Reviewed

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS				
Medications				
	StART		AHRQ	
Aripiprazole	Not Reviewed		Academic Benefit Not Reported	
Methylphenidate*	Academic Benefit Not Reported		Insufficient Evidence	
Risperidone	Academic Benefit Not Reported		Academic Benefit Not Reported	

*StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.

Resources for Parents and Professionals

RESOURCES BY TOPIC

Adults

- *Adult Autism & Employment: A Guide for Vocational Rehabilitation Professionals*
by Scott Standifer, Ph.D.
<http://dps.missouri.edu/Autism.html>
- Advancing Futures for Adults with Autism (AFAA)
National consortium seeking to create meaningful futures for adults with ASDs
<http://www.afaaustralia.org/site/c.llyIkNZJuE/b.5063863/k.BE3C/Home.htm>
- Interactive Autism Network (IAN)
<http://www.iancommunity.org/cs/adults/>
- National Association of Residential Providers for Adults with Autism (NARPAA)
<http://www.narpaa.org/>

Applied Behavior Analysis (ABA) Consultants

- Association for Behavior Analysis International
<http://www.abainternational.org/>
- Association of Professional Behavior Analysts
<http://www.apbahome.net/>
- Behavior Analyst Certification Board
Provides a search tool to locate a board certified ABA therapist
<http://www.bacb.com/index.php?page=100155>

Intervention Best Practices

- Autism Speaks. ASD Video Glossary
<http://www.autismspeaks.org/what-autism/video-glossary>
- Autism Treatment Network (ATN)
Identifies centers offering high quality, coordinated medical care for children and adolescents with ASDs
<http://www.autismspeaks.org/science/resources-programs/autism-treatment-network>
- Interactive Autism Network (IAN)
Helps families explore a range of common treatment topics
http://www.iancommunity.org/cs/therapies_treatments/
- National Autism Center
May Institute's nonprofit center for the promotion of evidence-based practice, providing information, best practices, and resources for families, practitioners, and communities.
<http://www.nationalautismcenter.org/about/>
 - *A Parent's Guide to Autism and Evidence-Based Practice*
<http://www.nationalautismcenter.org/learning/family.php>
 - *Evidence-Based Practice and Autism in the Schools Educator Manual*
<http://www.nationalautismcenter.org/learning/practitioner.php>
- National Professional Development Center on Autism Spectrum Disorders
Briefs on Evidence-based Practice
<http://autismpdc.fpg.unc.edu/content/briefs>
- OCALI Autism Internet Modules
Free online modules designed to promote understanding, respect, and equality of persons with ASDs
<http://www.autisminternetmodules.org/>
- Organization for Autism Research (OAR)
People, places, and information within the autism and research communities
<http://www.researchautism.org/resources/reading/index.asp>
- Rapid Response Evidence-based Practices Module
<https://extweb.missouri.edu/courses/default.aspx?courseid=90>

Transition Best Practices

- Autism Speaks Transition Tool Kit
A guide to assist families on the journey from adolescence to adulthood
http://www.autismspeaks.org/community/family_services/transition.php
- *Life Journey Through Autism: A Guide for Transition to Adulthood*
by Danya International, Inc.; Organization for Autism Research; and Southwest Autism Research & Resource Center
<http://www.researchautism.org/resources/reading/documents/TransitionGuide.pdf>
- MPACT
Assist parents in effectively advocating for their children's educational rights and services
<http://ptimpact.org/Transition/Transition.aspx>
- MU Thompson Center for Autism and Neurodevelopmental Disorders
 - Resources helpful in planning the transition of a child with ASD into adulthood
<http://asdtransition.missouri.edu/>
 - Transition online module <http://thompsoncenter.missouri.edu/morr/free%20images/transition%20flyer%2009-02.pdf>
- Project ACCESS
Transition fact sheet
<http://education.missouristate.edu/access/FactSheet10.htm>
- *Students with Disabilities Preparing for Postsecondary Education: Know Your Rights and Responsibilities*
Office for Civil Rights, U.S. Department of Education
<http://www2.ed.gov/about/offices/list/ocr/transition.html>
- Transition Coalition
Online information, support, and professional development
<http://transitioncoalition.org/transition/>
- *Understanding Asperger Syndrome: A Professor's Guide*
Organization for Autism Research (OAR) video focused on educating professors, teaching assistants, and others to help college students with ASDs succeed
<http://researchautism.org/resources/AspergerDVDSeries.asp>

MISSOURI-SPECIFIC RESOURCES

State Departments, Agencies, and Programs

Department of Elementary and Secondary Education

www.dese.mo.gov

▪ First Steps

First Steps is Missouri's lead agency for the state's early intervention program. This program is designed for children, birth to age 3 years, who have delayed development or diagnosed conditions associated with developmental disabilities including children diagnosed with ASDs. First Steps offers coordinated services and assistance to very young children and their families. Types of services available include speech therapy, occupational therapy, physical therapy, service coordination, transportation, and applied behavior analysis.

- www.dese.mo.gov/divspeced/FirstSteps/
- <https://www.mofirststeps.com/>

▪ Parents as Teachers

This parent education program offers services within an organized curriculum, personal visits by a certified parent educator, and group meetings designed around child development and parenting skills.

- <http://dese.mo.gov/divimprove/fedprog/earlychild/ECDA/Index.htm>
- <http://www.parentsasteachers.org/>

APPENDIX D

Department of Elementary and Secondary Education

(CONTINUED)

■ Early Childhood Special Education

Children ages 3 to preK-5 with ASDs may qualify for early childhood special education (ECSE) services under the Individual with Disabilities Education Act (IDEA).

<http://dese.mo.gov/directory/>

■ Local School Districts – Special Education

All school districts in Missouri are required to provide a free and appropriate education to all students ages 3 to 21 years. For children ages 3 to preK-5, see ECSE above. Students ages 5 to 21 years with an ASD may qualify for special education services and/or educational accommodations. Contact your local school district for more information.

<http://dese.mo.gov/directory/>

■ Individuals with Disabilities Education Act (IDEA)

<http://dese.mo.gov/divspeced/Compliance/specedlawsregs.html>

■ Office of Special Education

The Office of Special Education administers state and federal funds to support services for students and adults with disabilities. This office works with other state and local agencies to coordinate the Missouri First Steps program for infants and toddlers with disabilities and their families. The office works with local school districts to develop and improve special education services for students (ages 3 to 21 years). This office also oversees the operation of three school systems administered by the State Board of Education.

<http://dese.mo.gov/se/>

– DESE's Office of Special Education Compliance

<http://dese.mo.gov/divspeced/compliance/>

Provides helpful information regarding school-age consumers such as:

– Parent's Guide to Special Education in Missouri

<http://dese.mo.gov/se/parentresources.html>

– Transition from First Steps to Early Childhood Special Education

<http://dese.mo.gov/se/fs/Transitionindexpg.htm>

– Standards and Indicators

<http://dese.mo.gov/se/compliance/StandardsManual/>

– Compliance

<http://dese.mo.gov/se/compliance/>

– ECSE Frequently asked questions

<http://dese.mo.gov/se/compliance/Q&A/ECSE.html>

– DESE's Office of Special Education Effective Practices

<http://dese.mo.gov/se/ep/>

Provides helpful information regarding school-age consumers such as:

– Autism Programs, Services, Resources

http://dese.mo.gov/se/ep/autism_progs.htm

– Post-Secondary Transition

<http://dese.mo.gov/se/ep/Transition.htm>

<http://transitioncoalition.org/transition/section.php?pageId=150>

<http://missouritransition.org/moodle/index.php>

<http://education.missouristate.edu/access/FactSheet10.htm>

<http://ptimpact.org/Transition/Transition.aspx>

<http://dese.mo.gov/vr/transition.htm>

– Evidence-based Practice

<http://dese.mo.gov/3tieredmodels/ebpc/>

– Parent Involvement

<http://dese.mo.gov/se/se-ep-parentinvolvement.htm>

– Assistive Technology

<http://dese.mo.gov/se/ep/assistivepage.html>

■ **Project ACCESS**

Project ACCESS provides autism resource information to public schools via on-site, telephone, and internet consultations. In addition, Project ACCESS designs autism-specific professional development opportunities and trains professional credentialed individuals to present these courses through Missouri's Regional Professional Development Centers. These trainings are offered to Missouri school district staff and educators who work with youngsters ages 0 to 21 years who have Autism Spectrum Disorder (ASD) and related disabilities.

<http://education.missouristate.edu/access/default.htm>

■ **Missouri Regional Professional Development Centers (RPDCs)**

<http://www.dese.mo.gov/divteachqual/leadership/rpdc/>

■ **Missouri Parents Act (MPACT)**

Provides information and training for parents concerning their child's educational services
www.ptimpact.org

■ **Missouri Vocational Rehabilitation**

Missouri Vocational Rehabilitation (VR) offers a wide range of services, including guidance and counseling, job-seeking skills and job placement, vocational training, transition services, supported employment services, assistive technology services, and the Ticket to Work Program. Individuals work with VR counselors to decide which services will help them become employed.

<http://dese.mo.gov/vr/vocrehab.htm>

Department of Insurance, Financial Institutions, and Professional Registration

<http://difp.mo.gov/>

- HB1311 was signed into law in 2010, requiring private insurance companies operating in Missouri to provide coverage under group health insurance policies for psychiatric care, psychological care, rehabilitative or rehabilitative care (including applied behavior analysis [ABA] therapy), and therapeutic and pharmacy care to children who have been diagnosed with autism spectrum disorder (ASDs). Those with individual health benefit plans (rather than coverage through employers) may add this coverage; however, there may be an additional cost. The law also establishes licensure requirements for therapists who provide ABA therapy to children with ASDs. These online resource centers offer details, starting with some of the key information bulleted below:

– Autism Parent Resource Center

- Answers to questions about Missouri's health insurance coverage for ASDs
- Glossary and common insurance terms
- Form for filing a complaint
- <http://insurance.mo.gov/consumers/autismFAQ/>

– Autism Provider Resource Center

- Identification of Missouri fully insured health plans
- Survey of health insurance companies regarding billing and other insurance-related matters
- <http://insurance.mo.gov/consumers/autismFAQ/Autismproviderresourcecenter.php>

– DIFP Guidance to Insurers

- Bulletins to explain how statutes and regulations will be implemented
- Non-retaliation policy
- Service of Process Questions and Answers
- <http://insurance.mo.gov/laws/sop.php>

– Behavior Analyst Advisory Board

- General rules and regulations for licensure
- Complaint form
- Disciplined licensees
- <http://pr.mo.gov/ba.asp>

APPENDIX D

Department of Mental Health

<http://dmh.mo.gov/>

■ Division of Developmental Disabilities

The Division of Developmental Disabilities is the mental health agency in Missouri that includes “autism” as one of the qualifying diagnoses for determining eligibility for services. The Division’s statutory role is to address prevention, to reduce stigma, and to provide services to people who have developmental disabilities, including people with ASDs. The Division is housed within the Missouri Department of Mental Health and offers a wide array of community-based services for people of all ages with developmental disabilities. The Division conducts eligibility and assessment for services through its 11 regional offices.

- <http://dmh.mo.gov/dd/>
- <http://dmh.mo.gov/dd/facilities/map.htm>

■ Office of Autism Services

The role of the Office of Autism Services is to provide leadership in program development for children and adults who have ASDs, including establishment of program standards and coordination of program capacity. The Office of Autism Services lends administrative support and technical assistance to the Missouri Commission on Autism Spectrum Disorders, with special attention to the development of the state plan for an integrated system of care. Other priority issues are outreach and education targeted for individuals, families, and service coordinators. The Office of Autism Services is housed within the Division of Developmental Disabilities.

<http://dmh.mo.gov/dd/autism/>

■ Missouri’s Autism Projects

Missouri’s Autism Projects were established as a vital communication link between public policy makers and individuals and families living with ASDs in Missouri. Now codified into statute, the program offers supports and services designed to enable individuals with autism to live at home and remain integrated within their communities. Five regional parent advisory councils and a state-level council are charged with making recommendations to Missouri’s Division of Developmental Disabilities on matters such as autism-related policy, funding models, and service providers.

<http://www.moga.mo.gov/statutes/c600-699/6330000220.htm>

■ Missouri Autism Rapid Response Initiatives

The Missouri Autism Rapid Response Initiatives are collaboratively supported by the Office of Autism Services and the Thompson Center for Autism and Neurodevelopmental Disorders. Online resources include:

- Regional brochures
<http://dmh.mo.gov/dd/autism/rapidresponse.htm>
- Trainings
<http://thompsoncenter missouri.edu/training/modules.php>

Department of Social Services

<http://dss.mo.gov/>

■ MO HealthNet Division

MO HealthNet Division purchases and monitors healthcare services for low-income and vulnerable Missouri citizens. The agency assures quality health care through development of service delivery systems, standards setting and enforcement, and education. Applications and enrollment information are available online.

<http://dss.mo.gov/mhd/>

Department of Health and Senior Services<http://health.mo.gov>**▪ Bureau of Special Health Care Needs**

This unit serves individuals with special healthcare needs who have or are at increased risk for a disease, defect, or medical condition that may hinder the achievement of normal physical growth and development and who also require health and related services beyond those generally required.

<http://health.mo.gov/living/families/shcn/>**FINANCIAL RESOURCES****Office of Autism Services**

As part of the Missouri Department of Mental Health, this office provides Missouri-specific information about programs that can help children and youth with developmental disabilities access some of the services they need. Some programs provide direct services, while other programs may help pay for services. Programs often include financial or other eligibility requirements, depending on individual and family circumstances.

<http://dmh.mo.gov/docs/dd/autfinresources.pdf><http://dmh.mo.gov/docs/dd/autfinancial.pdf>**Missouri Health Insurance Pool (MHIP)**

MHIP provides medical and prescription coverage to Missourians who cannot access insurance in the standard market because of a health condition and to those whose insurance through an employer has ended. MHIP's coverage is offered through two pools: the state pool and a federal pool. More information about MHIP coverage and eligibility requirements is available online.

<http://www.mhip.org>**OTHER MISSOURI RESOURCES BY TOPIC****Applied Behavior Analysis**

- Missouri Association for Behavior Analysis
<http://www.moaba.org/>
- Project ACCESS
Regional lists of ABA consultants
<http://education.missouristate.edu/access/ABAConsultants.htm>

Family Education and Support

- Missouri Families for Effective Autism Treatment (MO-FEAT)
Education and support for families and an online resource directory
<http://www.mofeat.org>
http://mo-feat.org/directory_Search.htm
- Missouri Family-to-Family (MoF2F)
Free statewide program providing information, referral services, parent connections, and leadership development opportunities
<http://www.mofamilyoffamily.org>
<http://www.sharingourstrengths.com>

Transition

- MO Online Community of Practice Supporting Transition Services
<http://missouritransition.org/moodle/index.php>
- Transition Coalition-DESE Partnership
- Provides training, technical assistance, and resources for secondary transition
<http://transitioncoalition.org/transition/>

APPENDIX E

Sample Intervention Plan

CLIENT INFORMATION	PROVIDER INFORMATION
NAME:	NAME:
DOB:	ORGANIZATION:
ROLE OF FAMILY:	
OTHER AGENCIES INVOLVED:	PLAN TO COORDINATE SERVICES:
1. INTERVENTION TARGET:	
LONG-TERM OUTCOME:	
SHORT-TERM GOAL:	
OBJECTIVE 1:	
OBJECTIVE 2:	
OBJECTIVE 3:	
INTERVENTION(S):	RESPONSIBLE PERSONS:

HOW WILL PROGRESS BE MONITORED?	
2. INTERVENTION TARGET:	
LONG-TERM OUTCOME:	
SHORT-TERM GOAL:	
OBJECTIVE 1:	
OBJECTIVE 2:	
OBJECTIVE 3:	
INTERVENTION(S):	RESPONSIBLE PERSONS:
HOW WILL PROGRESS BE MONITORED?	
INDIVIDUAL/RESPONSIBLE PARTY SIGNATURE:	
PROVIDER SIGNATURE:	

Index



INDEX

Index of Intervention Names

NOTE: Effective ASD interventions are listed in **bold**. The term “effective ASD intervention” is used by consensus of the Missouri Autism Guidelines Initiative to describe interventions ranked at the top level of research support by one or more of the systematic reviews summarized in this *Guide*

A

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